# ENGINEERING AND MINING JOURNAL

A McGRAW-HILL PUBLICATION

AUGUST 1961

PRICE ONE DOLLAR

FOUNDED 1866

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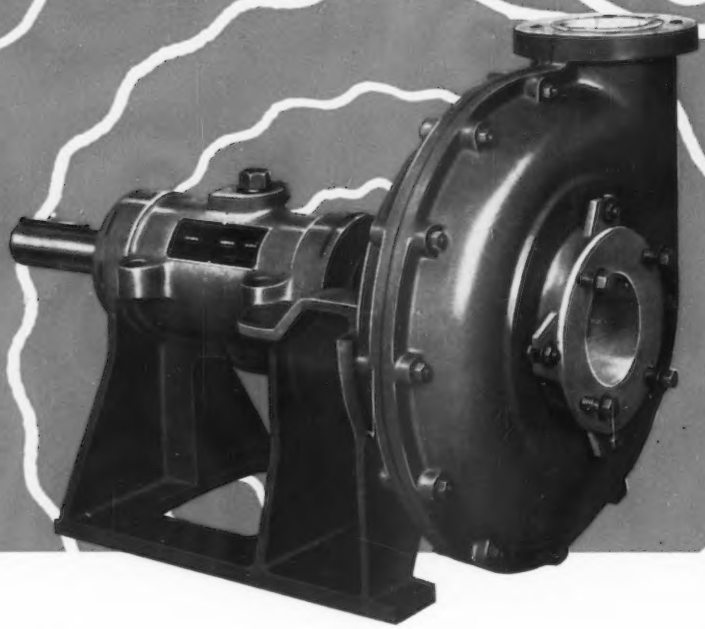
# RIPPLES ON STEEP ROCK LAKE



The first A-S-H pump to be tried in the beneficiating plants of Steep Rock Iron Mines Limited, Steep Rock Lake, Ontario, is a B-6-5 Hydroseal. About the kind of impression it made you can draw your own conclusion from the fact that five more Hydroseal rubber-lined pumps—three D-6-5's, one B-6-5 and an A-6-5, are now in service at Steep Rock. Let us suggest for you the right pumps, with proper elastomer or metal parts.

**THE ALLEN-SHERMAN-HOFF PUMP CO.**
**Dept. B—P.O. Box 635, Paoli, Pa.**
*Representatives throughout the World*

**HYDROSEAL** *and* **CENTRISEAL**
**SAND, SLURRY & DREDGE PUMPS**
MAXIMIX RUBBER PROTECTED

## IF PURCHASES ARE ENDORSEMENTS...

# P&H is the no. 1 choice of the mining industries

**In recent years 68% of all American made 4.5 to 9 yard electric mining shovels bought for use throughout the world have been P&H**

P&H has earned such widespread acceptance in the mining industries because of lower per-ton loading cost. This profit premium to owners of P&H Electrics results from these two basic advantages:

1. **Higher rate of production** made possible by exclusive, patented P&H design principles of MAGNETORQUE® Hoist Drive and Electronic Control. Both of these far-ahead design principles are the direct result of Harnischfeger designing and manufacturing its own electrical equipment—the *only* shovel manufacturer to do so.
2. **Vastly superior service and parts availability** reflecting our partnership of responsibility to you, the buyers of our products—a partnership of responsibility made possible by our *single source control* of electrical as well as mechanical components and their performance.

Your satisfaction with these advantages has made us The *World's Largest Builder of Full-electric Shovels.* Compare before you buy—write for complete information.

**HARNISCHFEGER** **P&H**
*Milwaukee 46, Wisconsin*

## *Mining Calendar*

Diamond Drilling Symposium, Broken Hill branch, Australasian Institute of Mining and Metallurgy, Broken Hill, N.S.W., Aug. 21-25

Conference on Metallurgy of Semiconductors, AIME, Hotel Ambassador, Los Angeles, Aug. 30-Sept. 1

11th National Chemical exposition, Chicago Section, American Chemical Society, Chicago, Sept. 5-8

American Mining Congress annual convention, Seattle, Wash., Sept. 11-14

Commemoration of the 50th Anniversary of Froth Flotation in the U.S. sponsored by MBD of SME, Cosmopolitan Hotel, Denver, Sept. 17-20, 1961

National Safety Congress and Exposition, Mining Section, Pick-Congress Hotel, Chicago, Ill. Oct. 16-19

American Vacuum Society, Eighth Annual Symposium, Washington, D.C., Oct. 16-19

The Metallurgical Society, AIME, fall meeting, Hotel Pick-Fort Shelby, Detroit, Mich., Oct. 23-26

Northwest Mining Association Convention, Davenport Hotel, Spokane, Wash., Dec. 2-3, 1961

Beneficiation and Agglomeration Symposium, 23rd annual symposium of the University of Minnesota, dealing with taconites, pellets and iron ores. U. of Minnesota, Minneapolis 4, Minn. for details. Meeting to be held in Duluth, Jan. 15-17, 1962

AIME annual meeting, New York City, Feb. 18-22, 1962

Pacific Southwest Minerals Industry Conference, sponsored by the San Francisco, Nevada and Southern California sections of AIME, Palace Hotel, San Francisco, April 12-14, 1962.

## *Coming Up*

**The price of lead**—It's too doggone low right now, which is no news to anyone in the industry. But, next month, E&MJ's favorite observer of the nonferrous metals industry, William P. Shea, of C. Tennant & Sons, will take another of his searching looks at lead and the next 15 years in lead prices.

Where will it go? Mr. Shea says up. Up to 14¢, anyhow, to keep up with the world demand. He'll back up his forecast with facts and figures in next month's issue.

**Flotation's 50th**—The mid-century birthday of flotation will be celebrated in Denver next month, and the editors are already at work on a fitting observation.

95th YEAR OF PUBLICATION

# ENGINEERING AND MINING JOURNAL

**AUGUST 1961**

A McGRAW-HILL PUBLICATION

*Volume 162, No. 8*

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# Hot stuff served up on rubber

**Improved B.F.Goodrich belt saves customer $5500 in 13 months**

THE cargo on that belt was causing plenty of trouble in this zinc plant. It's a highly abrasive sinter mix—still so hot at this point that it used to burn out belts after only 4 months' service.

When a B.F.Goodrich distributor heard about the trouble, he recommended a new kind of conveyor belt, called Solarflex, designed specifically for handling hot materials. This B.F.Goodrich belt is made of special rubber that stays soft and pliable at hot temperatures that cause other belts to harden, crack and finally break down.

At last report, the B.F.Goodrich Solarflex belt had been on the job 13 months. Belt service had tripled. And the customer had saved over $5500 in belt replacements and installation costs.

When you call on a B.F.Goodrich distributor for help with a conveying problem, you can count on getting the kind of belting that will keep things in your plant moving, cut down on repairs, and give you more for your money in terms of long, useful service.

BFG distributors have full information on this hot-material belt. And, as factory-trained specialists in rubber products, they can answer questions about the many products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Department M-156, Akron 18, Ohio.*

**B.F.Goodrich**

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# *Articles in this issue of*

# ENGINEERING AND MINING JOURNAL

*Continued from p 2*

**70 Iron Ore Mining in Western North America**

Back in October 1957, E&MJ's correspondents in the Western states took a long hard look at the beginnings of an iron ore industry expansion. This month we are publishing an update of that story, with an important addition—British Columbia. Like many of the Western U.S. properties, the B.C. producers are finding a market for iron ore across the Pacific, in Japan.

The long-awaited expansion of steel production in the West is coming, with the new Atlantic City project joining Kaiser, CF&I and U.S. Steel at Provo—with the Japanese providing the base for other new mines.

**72 Bigger and Speedier Haulage Equipment for Taconite**

Reserve Mining Co.'s big, rugged trucks, custom built to work in the sprawling Peter Mitchell pit, are helping that company to achieve expanded production goals and improved efficiencies. The trucks, rated at 85-long-ton capacity, are side-dump tractor-trailer units. The tractor is powered by two 235-hp diesel engines.

**74 Modernization Pays Off at Overpelt, Belgium**

The old conventional horizontal zinc retort, believed by many to be completely outmoded by other processes, responds astonishingly to modernization at the Overpelt zinc works in Belgium. Capacity is doubled, manpower requirements cut in two, and other substantial savings realized through complete mechanization of the old plant.

**79 What U.S. Gold Miners Have Been Waiting For**

A new dry-land dredge, developed by engineers of United Placer Industries to extract gold from the vast Western placers in desert areas, is now in operation on a development basis in Arizona. UPI believes that the new unit will restore the U.S. to its place as "a foremost world gold producer."

**80 Mexico Gains a New Company—Mining Gains New Vigor**

The "Mexicanization" of U.S.-held mines in Mexico, a move that has been carefully watched by the industry all over the world, has its first prototype in operation. American Metal Climax's Penoles operation is now a 51% Mexican-owned company, to the outspoken satisfaction of both parties.

Industry leaders are viewing the formation of Metalurgica Mexicana Penoles as a possible break in the long-standing reluctance of Latin American capital to invest in mining enterprises, even within their own boundaries.

**86 A Census of the Big Belt Conveyors—And How They Grew**

Economic distances for belt conveyor haulage are increasing steadily, and new records are being set every few months. Starting on p 86, expert E. R. Traxler takes a look at some of the longest and strongest and comes up with a pair of tables worthy of study by every mining man who is confronted by haulage cost increases.

**18 An Industry Hears Some Frank Talk—Idaho Mining Assn.**

At Sun Valley last month, the Idaho Mining Association heard Government and industry spokesmen outline the basic problems facing mining today. Rarely has so much forthright opinion and information been presented from a speakers' platform. For instance: "Gold and silver legislation for this session of the Congress is dead." E&MJ's coverage of the meeting begins on p 18.

# Versatile Cat Wheel Loader scores high in tough grind at 3-shift tungsten mine

Cat Wheel Loader makes fast work of truck loading at Tungsten Mining Corp. operation, Henderson, N.C. The cut and fill method is used to mine the tungsten-bearing quartz rock. Ore is brought to the surface, loaded into trucks and transported to the processing mill. The waste material is then returned to the mine for use as fill.

**TUNGSTEN MINING CORPORATION** keeps its Cat 944 Wheel Loader rolling 24 hours a day, six days a week. On first shift at the mill the 2 yd. 944 truck-loads ore tailings which are hauled back to the mine and dumped down or near the shaft. On second and third shift the loader runs back to the mine and dozes the stockpiled tailings into the shaft, backfilling the mined area.

"There are several big reasons why we've got a 944 doing this work," Vice President and General Manager W. L. Kendrick told us. "Look at it step by step: first of all we need dependability when we're running a machine 24 hours a day, and our experience with Cat has been just that—dependability. In the truck-loading operation, I don't think there's a faster-cycling loader than the 944. Its excellent visibility, power shift transmission and automatic bucket positioners really simplify the operator's job. At the mine we've got the loader working as a bulldozer in that tough abrasive quartz. The 944 doesn't spin its tires much; it's got the proper power-to-weight ratio to push that stuff without spinning. And when an operator is running the loader from the plant out to the mine, the tight steering gives him confidence to roll fast, not waste time snailing along the highway."

For speed, durability and utility in any mining operation, you can't beat Cat Wheel Loaders. There are three diesel-powered units to choose from with bucket capacities up to 4 yd. (Gasoline power is optional on the two smaller models.) Ask your Caterpillar Dealer for specific mine application data. He'll show you how to cut your handling costs.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

**CATERPILLAR**

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**CAT LOADERS FOR SPEED, FOR LOWER COSTS**

**The following news items are reprinted substantially as they first appeared in the AMERICAN JOURNAL OF MINING, the publication which became *E&MJ*.**

[TELEGRAM]

To H. A. Jones, Treasurer
Cosmos Silver Mining Co.,
New York:

"Little Giant" mill accepted, pulverizes 1,000 lb per hour, eight hourse power, seventy sieve (5,000 meshes to the in.), all right.

(signed) Wm. Musgrave, Supt.

**WASHINGTON, MARCH 1866**—The Senate has just given a New York company the sole right to lay a cable from Florida to Cuba, on a condition that it is done within three years. It is understood that it will be completed at once and then extended down the entire length of the Southern American states.

**ALABAMA, MARCH 1866**—Oil has been struck by parties who were boring for it at Gadsden, on the Coosa River, and the whole country thereabouts is in a state of intense oleaginous excitement.

**NEW YORK, MARCH 1866** — An English mining engineer, recently returned from the mines of Colorado, says: If there were discovered a process by which those refractory ores could be . . . desulphurized, there would be gambled away in Colorado, within the next ten years, more bullion than would suffice to pay the American National debt.

**IDAHO, MAY 1866**—The Owyhee *Avalanche* of the 10th of March says: Messrs. More & Fogus have cleaned up $26,000 from Oro Fino rock during the past week. The Morning Star mill is now running on Morning Star rock, and we expect to chronicle a big average yield soon. The Lincoln mill starts its stamps the coming week.

**PENNSYLVANIA, APRIL 1866** — Of Livinstone City, "It is a peculiar place —every alternate house is a saloon. one-half of the balance are restaurants, and the remainder are hotels. The inhabitants are a very economical set; they import barrels of whiskey and export barrels of oil—thus saving freight on "empties".

*This month in*

# ENGINEERING AND MINING JOURNAL

*Continued from p4*

## *Behind the By-Lines*

**In the merry mash** of getting out last month's issue on time, we forgot to tell you about our new "Monitor" section. Now, in case (heaven forbid) you haven't noticed, we'd like to discuss the innovation. We've combined our patents, books and new products sections into one monthly package of new ideas, new literature and new equipment and christened it "Monitor," to indicate that it represents the culling and poring over of more than a million words of description, specification and content every four weeks to yield the eight pages of concentrated, useful and timely information which you receive each month.

There's one drawback. In building "Monitor," we've eliminated the post-card order blank which you use to request free literature from manufacturers and substituted a coupon which must be torn out and put in an envelope. We're sorry if the new method will inconvenience you, but we're sure it will improve E&MJ's service.

And, we're kind of hoping that the use of an envelope will remind some of our readers to give us a name and address along with the coupon. You'd be surprised how many requests we get with no identification of the sender. Even our enterprising Miss Ryan, who handles the service, can't help us there.

**If we ever get a couple of fortnights free,** we intend to devote it to a collection of stories about Cousin Jacks. Obviously we're not alone. Forbes Wilson, a vice president of Freeport Sulphur Co., is also a collector and forwarded the following just last month—he found it among the "Proceedings of the Geological Society (London, England) of January 23, 1856."

In the Proceedings, Prof. D. T. Ansted, M.A., F.R.S., F.G.S., makes the following comment about working conditions at the old El Cobre Mine, near Santiago, Cuba:

"The mines and districts are by no means unhealthy, although there has often been considerable mortality amongst the white (Cornish) hands, owing to want of prudence and caution whilst above ground."

**A good friend of ours in Boston** has forwarded a collection of quotes from a brochure put out by a printer in the home of the bean and the cod. They made our day much brighter.

"It was a woman drove me to drink. And, son-of-a-gun, I never wrote to thank her." W. C. Fields.

"He who retires early to save candles begets twins." Ancient Chinese proverb.

"The Field Marshal acted in the best tradition of the British Army —he sold his life dearly." Winston Churchill commenting on the publication of Montgomery's memoirs.

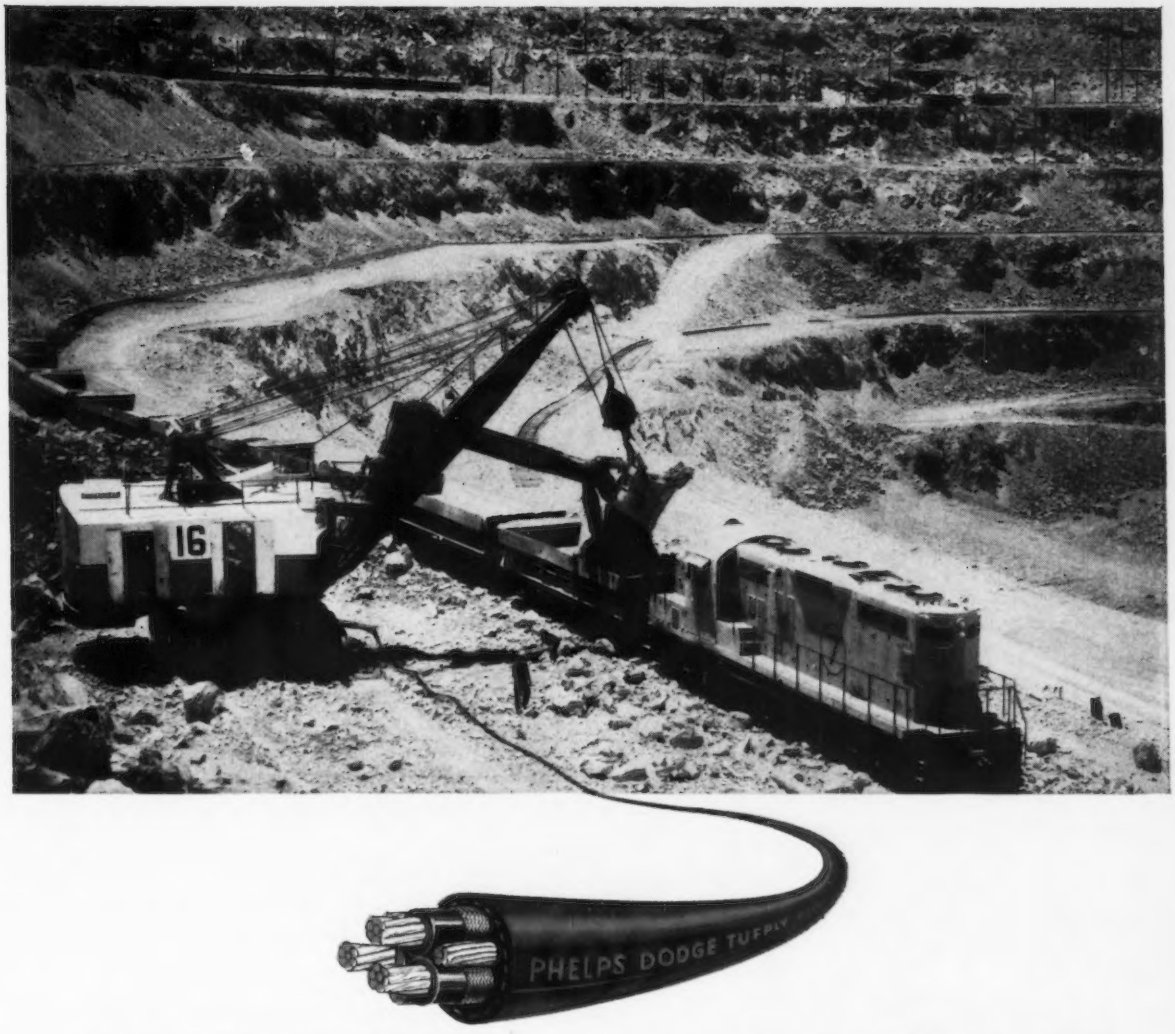
"I have never killed a man, but I have read many obituaries with a lot of pleasure." Clarence Darrow.

A carpenter once said: "Best rule I know for talkin' is the same as the one for carpenterin'. Measure twice and saw once."

"It's ninety percent of the politicians who give the other ten per cent a bad name." CHANGING TIMES.

From an old etiquette book quoted in the MANCHESTER GUARDIAN: "When a Gentleman offers a Lady his chair, he should engage her in conversation for a few minutes, thus giving the seat time to cool off."

CABLE DAMAGE PROBLEM? THIS COLORED JACKET CAN HELP YOU!




# Phelps Dodge Tufply Cable

Phelps Dodge TUFPLY portable cable is now available with a brightly colored jacket that has been found to be most effective in prolonging cable life by reducing cable damage. First used and proven in Phelps Dodge's own mining operations, the colored outer jacket helps prevent needless damage to the cable by making it clearly visible to equipment operators. As a result, the service life of the cable with this colored jacket is greatly increased.

TUFPLY portable cable represents years of Phelps Dodge mining "know-how" combined with many years of cable manufacturing experience. Made of highest quality copper from Phelps Dodge's own open-pit mines, the cable assures utmost protection and finest performance in both above and below ground mining projects. TUFPLY is listed by the U. S. Bureau of Mines; approved by the Dept. of Mines, Commonwealth of Pennsylvania, P-114-BM

*First for Lasting Quality—from Mine to Market!*

PHELPS DODGE COPPER PRODUCTS
CORPORATION
300 Park Avenue, New York 22, N. Y.

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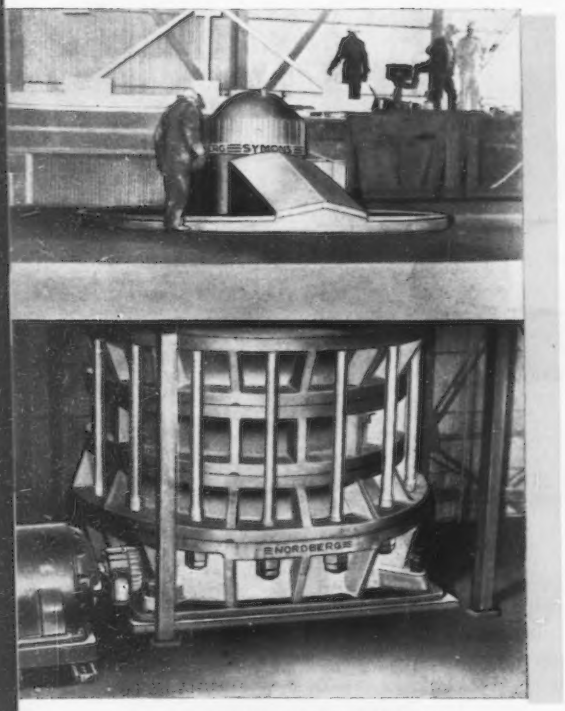
*Users repeatedly specify*

# NORDBERG MACHINERY

*for reliable, low cost production of ORES and MINERALS*



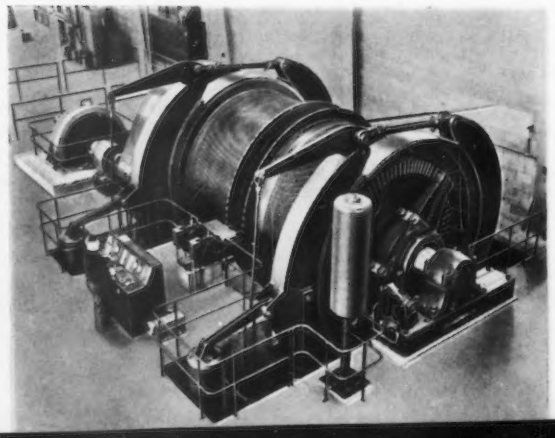

Your interest in lowering the cost, improving the quality, and raising the production of metallic and non-metallic ores and industrial minerals is a mutual interest which Nordberg has shared with the mining industry for 75 years.

This common interest and the many years of broad, yet intimate experience with the mining fraternity is reflected in the effectiveness and quality of Nordberg mining machinery. It is because of this background that Nordberg continues to lead in the design and construction of mining machinery which is *consistently first choice of the world's leading ore and mineral producers.*

***SYMONS . . . a registered Nordberg trademark known throughout the world.***

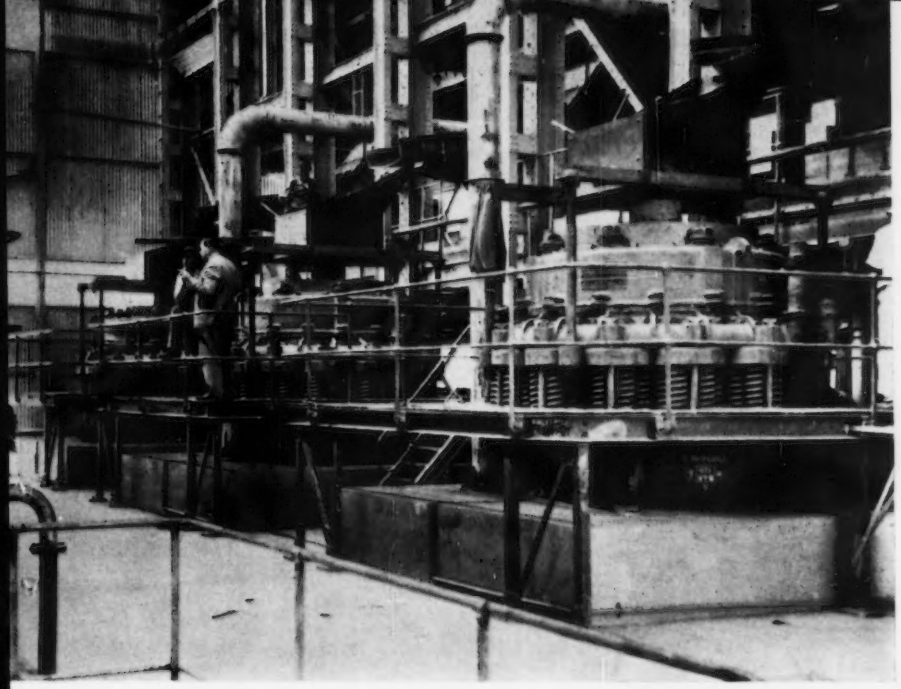
**FOR PRIMARY CRUSHING OF MOLYBDENUM**

This 60″ Symons Primary Gyratory Crusher has seen several years of service in the primary breaking of "moly" ores in Colorado. Other heavy duty Symons Gyratory Crushers are built with 30″, 42″, 48″, 54″ and 72″ feed opening widths and for capacities to 3500 or more tons per hour.



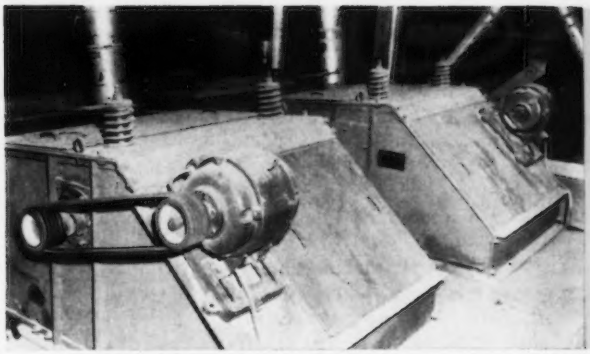
**FOR HOISTING IRON ORE**

Nordberg Mine Hoists for men and material are built in both conventional drum types as well as friction types . . . for push-button semi-automatic, fully automatic or manual control. Shown is a typical conventional double drum hoist.



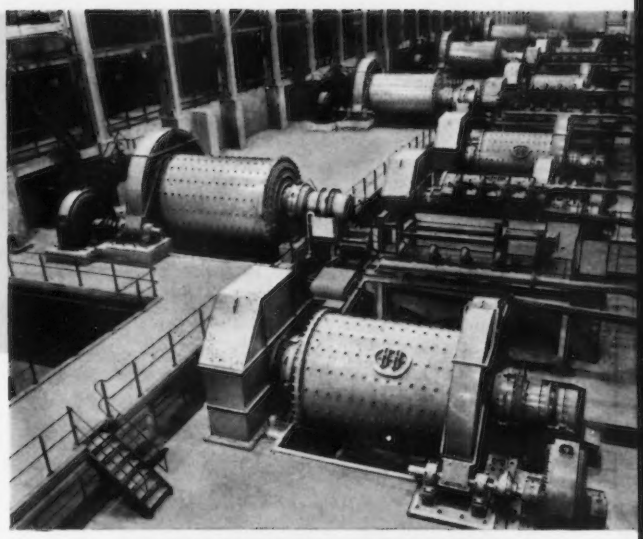
**FOR FINE REDUCTION CRUSHING OF COPPER**

These three Symons Cone Crushers are serving a Northern Rhodesian copper mine installation. Used for low cost, continuous production of quality products, Symons Cones are first choice of major producers the world over, in capacities to over 1500 tons per hour.



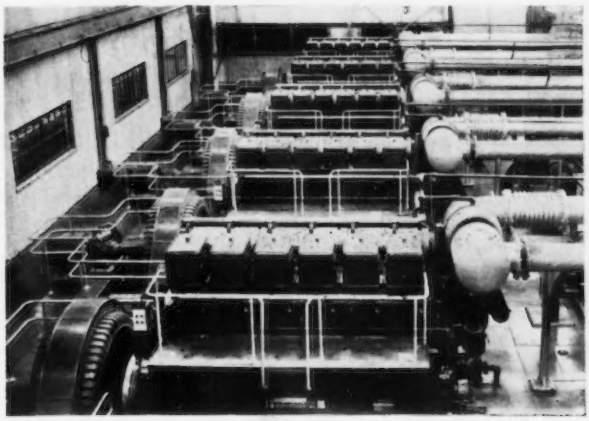
**FOR SCREENING URANIUM ORE**

These two 4′ x 8′ Symons Rod Deck Screens serve a large uranium processing operation in Canada. Other Symons Vibrating Screens are built in a wide range of types and sizes to handle numerous ore and mineral separation jobs from scalping to fine screening.



**FOR GRINDING TACONITE**

Shown are but a few of the many Nordberg Grinding Mills being used to reduce hard, abrasive taconite iron ore to the fineness of flour. Nordberg mills include Rod, Ball, Pebble, Tube and Compartment types, in sizes to 13′ in diameter and up to 50′ in length.



**FOR POWER GENERATION**

Nordberg 2-cycle and 4-cycle diesel, Duafuel®, and spark-ignition gas engines are reliably serving the mining industry in many parts of the world. Sizes range from 10 to over 12,000 hp in a single engine.

**NORDBERG MANUFACTURING COMPANY • Milwaukee 1, Wis.**

ATLANTA CLEVELAND DALLAS DULUTH HOUSTON KANSAS CITY MINNEAPOLIS NEW ORLEANS NEW YORK PHOENIX
ST. LOUIS SAN FRANCISCO TAMPA WASHINGTON WICHITA, KANS. TORONTO VANCOUVER JOHANNESBURG LONDON MEXICO, D. F.

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M-160

# Better than ever from

# TOP

# TO

# BOTTOM

Top to bottom improvements in the Timken® threaded carbide insert bit assure you more hole-per-bit—lower cost per foot-of-hole. A new brazing process bonds the tough carbide inserts firmly to the bit body to resist shocks better. Inserts can be reconditioned many times. And throughout, Timken bit bodies are stronger—improvements in our heat treating process produce greater uniformity in hardness and structure. The resulting greater strength practically eliminates ring-off and breakage.

More reasons why you get more hole-per-bit: the 5 front hole design, pioneered by the Timken Company, shoots air or water straight against the rock face; then, the deeper, wider wing clearance lets chips wash back faster. Drilling goes faster. And with Timken bits you get on-the-job service from Timken Company field engineers, the kind you can't get anywhere else. It's another reason why more miners drill with Timken bits than with any other removable bit.

There's a complete range of sizes and types of Timken threaded bits for your drifters, sinkers and stopers. Send for full information in free brochure, "Timken Removable Rock Bits". The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

**FOR OTHER TOUGH DRILLING JOBS**

**ALL-STEEL MULTI-USE**

This improved Timken bit gives you lowest cost per foot-of-hole when you can drill out full increments of steel.

**TAPERED SOCKET BIT**

Secure union gives the strength of one-piece steels. Same improvements and features as the threaded bit.

# TIMKEN®

**removable rock bits**

GOODYEAR

# Q: What do Goodyear Earthmover Rims have that no others have?

# A: MORE times FOUR

**1. MORE rims on the job:** More tons are hauled on—more earth-moving equipment rides on Goodyear rims than on any other kind. Result: You reap the benefits of the widest, soundest experience in rim design, manufacture and use.

**2. MORE kinds of rims:** Maximum rim performance stems from proper specification. Goodyear makes the *only complete line* of earthmover rims. Result: The choice that permits you to get exactly the right rim for the job.

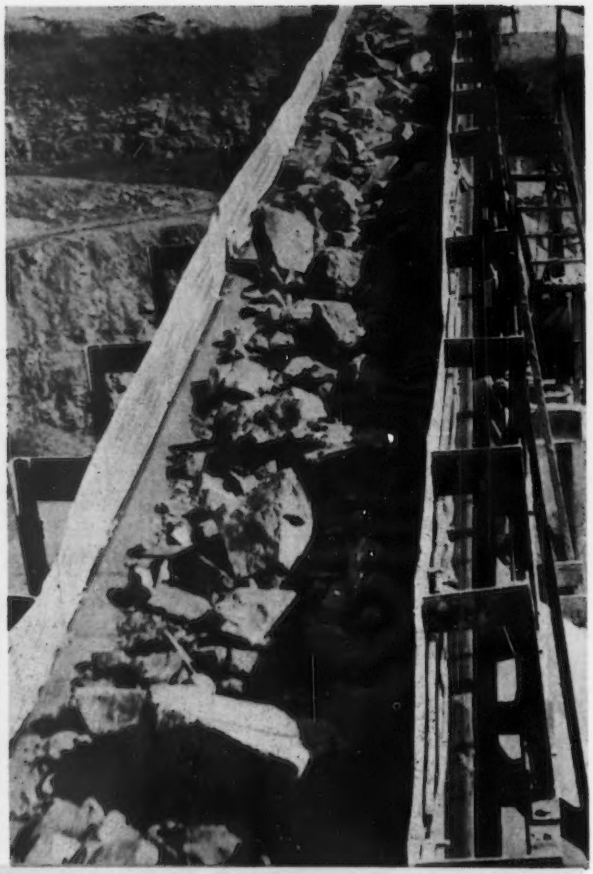
**3. MORE rim engineering help:** Goodyear has more engineers designing *and selling* rims than any other company. And they know tires, too. Result: The help you need in choosing the right rim for top performance—longer tire life.

**4. MORE rim "firsts":** The first *true* earthmover rim, the first 5° rim, the first tubeless rim—in fact, every major earthmover rim advance was made by Goodyear. Result: The very latest in rim design and manufacture at work, for you.

What better reasons for choosing Goodyear as your rim supplier? Only these: The desire and ability to design and build any rim that may be needed for *tomorrow's* earth-moving equipment. No matter what your rim needs or plans, you'll find it pays to call on Goodyear. See your local rim distributor, or write: Goodyear, Metal Products Division, Akron 16, Ohio.

**Lots of good things come from**

# GOODYEAR



# Acme-Hamilton introduces "Hy-Impact" Conveyor Belt with "Shock-Weve"!

Over 500,000 tons of rock have been hauled from the primary crusher on new "Hy-Impact" belt at each of three well known plants across the country where 200,000 to 250,000 tons of rock hauled on regular belt was considered normal service life before replacement. For the past two years, Acme-Hamilton has been testing this completely new belt at these plants. To date they have hauled over 500,000 tons each without downtime due to damage, resplicing or replacement. Examination by engineers shows an expected service life of several hundred thousand more tons.

**New "Shock-Weve" fabric construction** is responsible for this overwhelming service life. Priced the same as conventional belting, "Hy-Impact" reduces cost by half or more because of its doubled service life. Write for more information about this new money-saving belt today. Dept. B-H.

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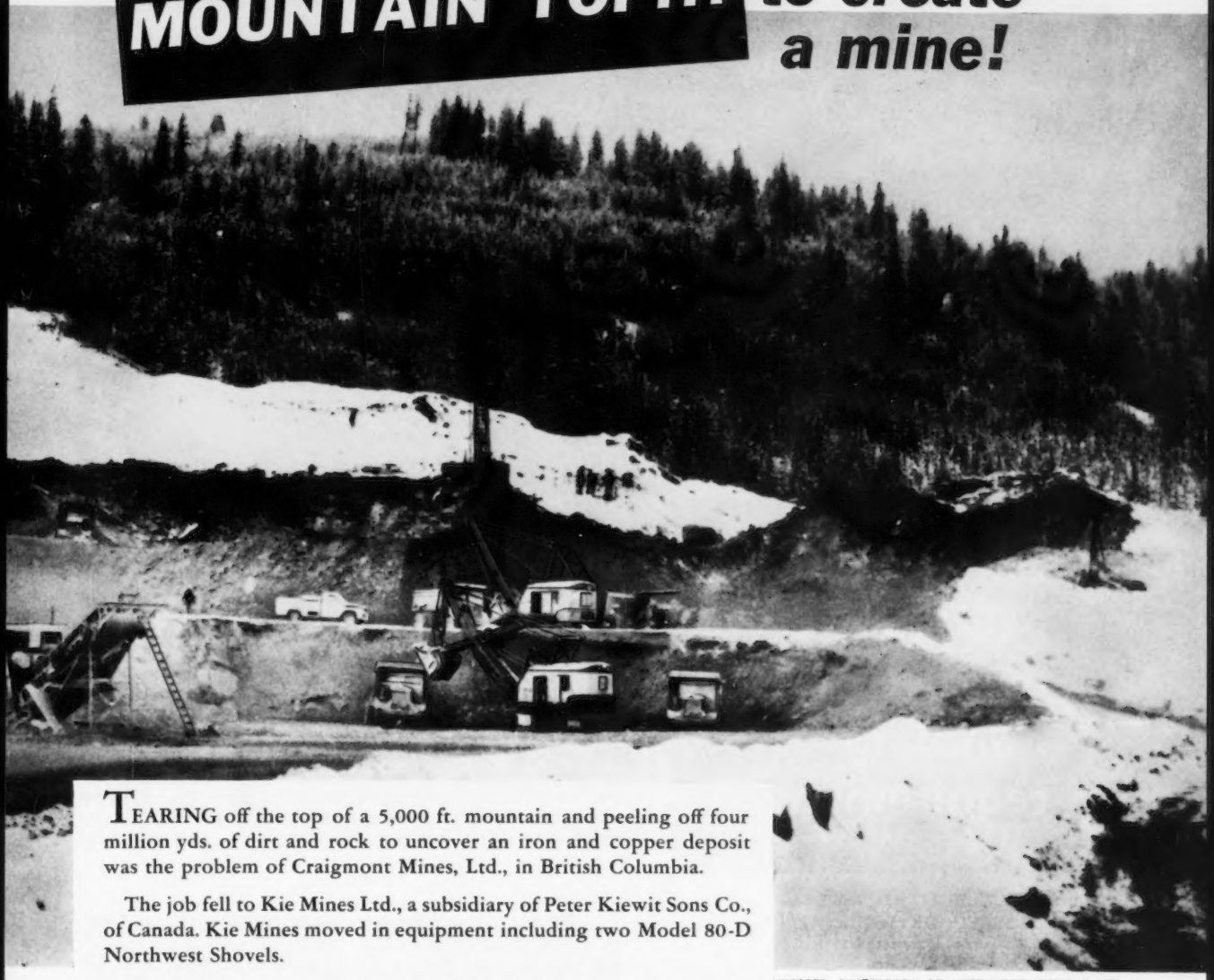
# KNOCKING OFF A MOUNTAIN TOP... to create a mine!



UNPOSED PHOTOGRAPH OF NORTHWEST DOING A JOB

TEARING off the top of a 5,000 ft. mountain and peeling off four million yds. of dirt and rock to uncover an iron and copper deposit was the problem of Craigmont Mines, Ltd., in British Columbia.

The job fell to Kie Mines Ltd., a subsidiary of Peter Kiewit Sons Co., of Canada. Kie Mines moved in equipment including two Model 80-D Northwest Shovels.

There were some 1.8 million yds. of highly abrasive rock. Even the dirt handled by the scrapers was so dense it had to be ripped before it could be picked up. Winter conditions dropped temperatures to sub-zero figures. Here was a job that was a challenge to the best in the business—a job where only top equipment would do.

Two Northwest 80-D's handled a large percentage of the rock and worked on a two-shift schedule, six days a week.

Tough jobs are an old story to Peter Kiewit operations. They know what it means to have equipment you can count on, and they have demonstrated their confidence in Northwest equipment with the recent purchase of their 192nd Northwest.

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CRANES • SHOVELS • DRAGLINES
PULLSHOVELS • TRUCK CRANES

3/4 to 3 Cu. Yd. Capacity

What Northwests can do for them, they can do for you. There are Northwest advantages that you should know about. You incur no obligation when asking about the machine that fits your problem.

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STEPHENS-ADAMSON builds a complete line of feeders to fit every need. From light duty units handling a few tons of light materials per hour to giant AMSCO Feeders built to take the impact delivered by thousands of tons of run of mine ore and stone. Material flow from hoppers and bins can be accurately controlled up to 3000 T.P.H. and more. The S-A Feeders consist of a series of overlapping steel pans attached to endless conveyor chain. A wide range of pan styles are available depending on the application. AMSCO Feeder Manganese steel pans and chain actually become tougher with continued use and impact. Many units are still in service after thirty years of rough treatment.

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THE TOUGHER THEY GET!
*Reg. T.M. American Manganese Steel Co.

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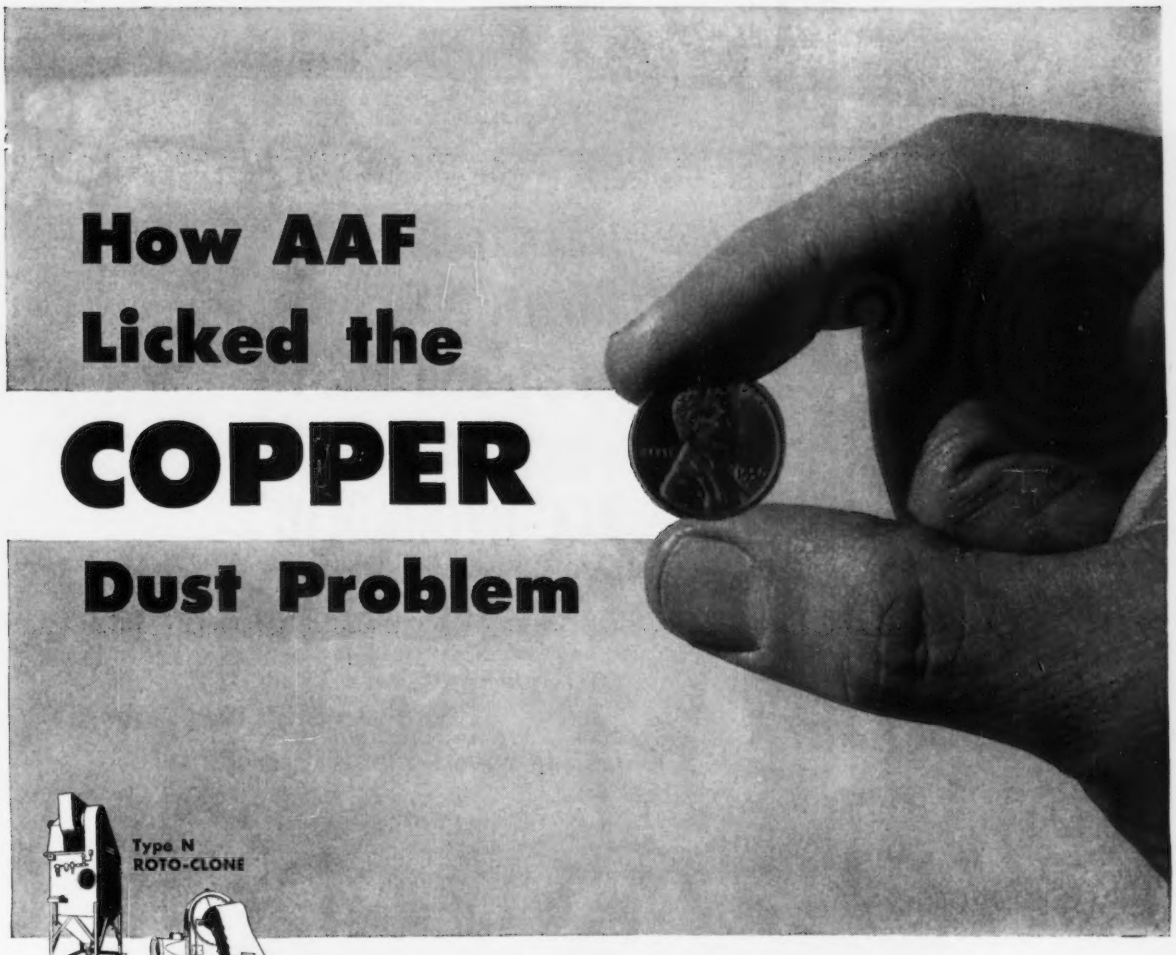
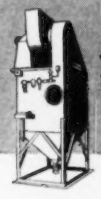
# How AAF Licked the COPPER Dust Problem





Type N ROTO-CLONE

Type W ROTO-CLONE

## AAF controls copper dust at thirteen processing plants

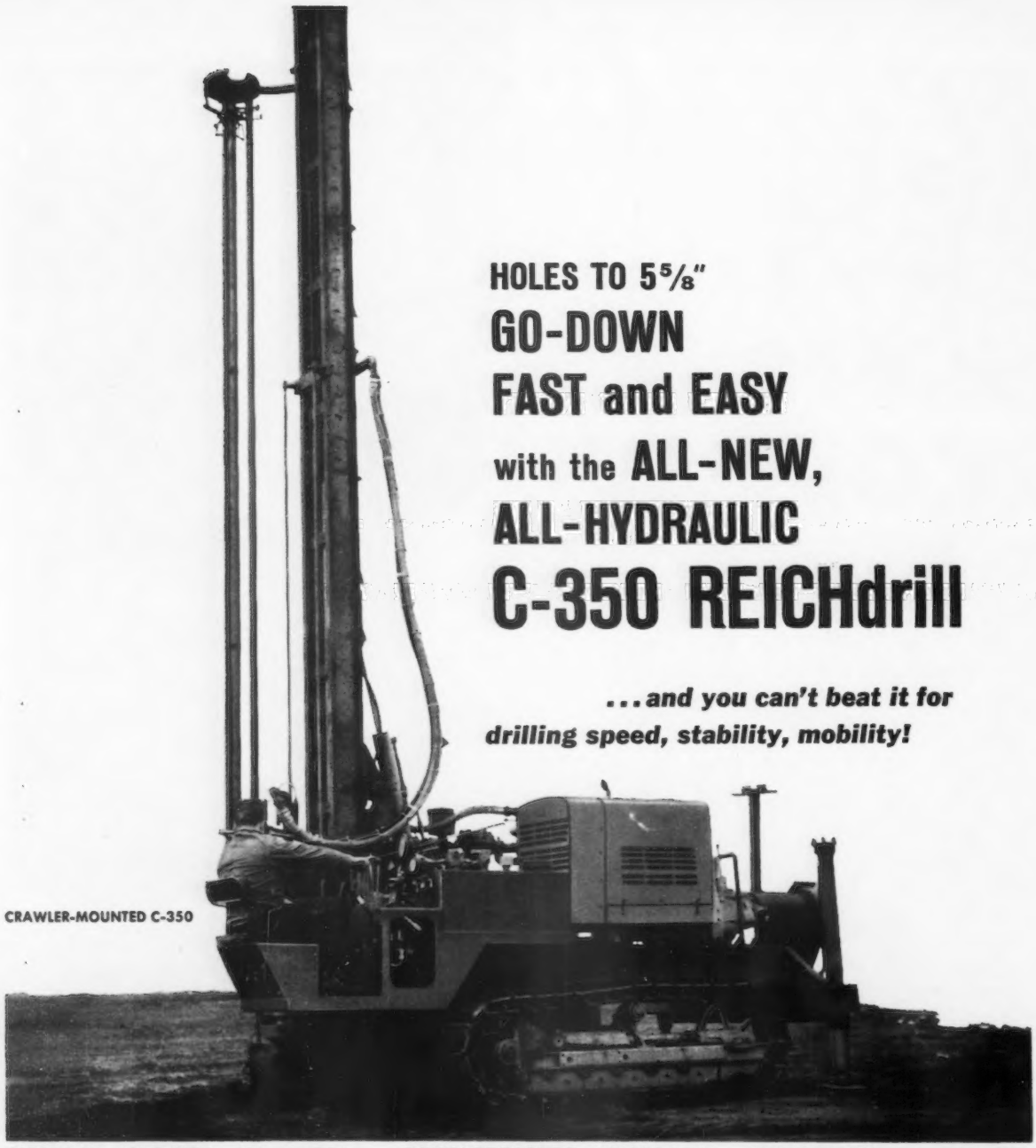
The copper industry was one of the very first to improve industrial and employee relations with modern dust control. The major dust-producing operations—crushing, milling, bucking room, sample mill—are now dust-free, thanks to AAF's wet-collecting Type N and Type W ROTO-CLONES.

The Type N combines centrifugal force with the thorough intermixing of water and dust-laden air. The Type W combines dynamic precipitation with dust-trapping water sprays — uses a minimum of water for sluicing the collected dust. Both offer (1) small space requirements, (2) maintained performance, (3) constant exhaust volume, and (4) high collection efficiency.

Take a tip from copper—call your local AAF representative or write direct for Type N ROTO-CLONE Bulletin 277. Address: Robert D. Moore, American Air Filter Company, Inc., 193 Central Ave., Louisville 8, Ky. In Canada: American Air Filter of Canada, Ltd., 400 Stinson Blvd., Montreal 9, Quebec.

AAF American Air Filter

BETTER AIR IS OUR BUSINESS



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## HOLES TO 5⅝"
# GO-DOWN FAST and EASY
## with the ALL-NEW, ALL-HYDRAULIC
# C-350 REICHdrill

***...and you can't beat it for drilling speed, stability, mobility!***

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*Easy Operation* is assured by all-hydraulic, labor-saving controls. *Stability* is provided by 14" wide tracks, low center of gravity and 8'8" wide frame plus 3 REICH heavy-duty hydraulic leveling jacks. *Mobility* is high because the crawler-mounted 350 trams at 7.8 MPH; climbs 25% grades, turns in its own length. *Versatility* is basic in REICHdrill design. The 350 is at home blastholing with 3-cone rotary bits, In-Hole Drills, or drag bits; and whether coring or prospecting.

A truck-mounted T-350 REICHdrill for greater mobility with all the above advantages, is also available. Get detailed specifications.

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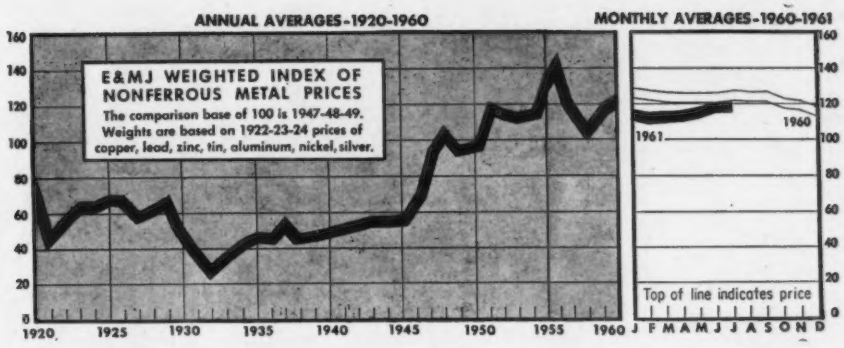
Division: CHICAGO PNEUMATIC TOOL CO.

# E&MJ OUTLOOK

## PRICES


ANNUAL AVERAGES-1920-1960
MONTHLY AVERAGES-1960-1961
E&MJ WEIGHTED INDEX OF NONFERROUS METAL PRICES
The comparison base of 100 is 1947-48-49. Weights are based on 1922-23-24 prices of copper, lead, zinc, tin, aluminum, nickel, silver.
1960
1961
Top of line indicates price
J F M A M J J A S O N D

## MARKETS

**E&MJ's nonferrous metal price** index increased from 120.041 in June to 120.452 in July. Copper was off slightly for the month, but tin and nickel prices moved substantially higher.

●

## AT HOME

**Continental Oil Co.** has entered into an agreement to explore for potash on leases and permits held by Sawyer Petroleum Co. and associates. The project involves some 8000 acres on the Crescent Graben in Grand County, Utah. E. W. Sawyer, Jr., president of Conoco, said that the venture could involve an investment of $20-million. The deposit is about 30 miles north of Texas Gulf Sulphur's project under development at Cane Creek, Utah.

**The 800,000-tpy expansion in pellet capacity** at the Republic mine of the Marquette Iron Mining Co. in Michigan is progressing on schedule and should be in production by early 1962. Cleveland Cliffs also announced that it has started work on the next portion of the plant which will bring the Marquette company's annual capacity up to 2.3-million tons.

**A significant silver vein has been discovered** on the 3200 level at the Galena property of the Callahan Mining Co. in the Coeur d'Alene mining district of Idaho. The vein lies north of the Polaris fault in an ore zone separate and distinct from the silver vein developed by the company to the south since the mid-Fifties. The North vein also runs considerably higher in silver values than the South vein.

**Gold, silver, iron ore, bismuth, sulphur and tellurium** have been added to the list of mineral commodities for which exploration assistance is provided by the Office of Minerals Exploration, Interior Department. The Government's share of exploration costs under the amended regulation, effective July 20, 1961, for all eligible commodities continues at 50%.

●

## LABOR

**The Administration's labor specialists** are drawing up a list of legislative approaches that could be used by the White House to handle major strikes. (See Labor This Month, p 21.)

●

## ABROAD

**Western Australia** has granted 27 temporary iron ore permits to explore in government reserves covering more than 4100 sq mi. Successful applicants were Rio Tinto of Britain; Utah Development Co. of America; Cyprus Mines, Ltd., of Britain; and Duval Holdings Pty., Ltd., representing Japanese interests. The permits are valid for two years. Broken Hill Co., Ltd., of Australia was granted three permits.

**Meissner Engineers, Inc., of Chicago, Ill.,** has signed an agreement with the Dominican Government to develop the country's huge iron ore reserves. Investments involved will total approximately $60-million which will include building of a railroad and port. The Dominican Government will retain a 51% interest in the project.

# THIS MONTH IN MINING

TRADITIONAL casual dress, frank discussions are enjoyed by Bill Irwin of Armco Steel, left, and R. H. Crouse, F. P. Hendrickson and J. R. Matlock, all of Monsanto Chemical.

SUN VALLEY'S SUN was enjoyed for a few moments by Mrs. A. H. Wegner, Spokane, Mrs. L. J. Randall and Mrs. Harry J. Magnuson of Wallace and Mrs. E. F. Cook, Moscow.

## Idaho Miners Tackle Major Industry Problems

**Wilson, Hardy and McConnel cite specifics in attacks on lead-zinc markets, silver's critical position, and the Wilderness Bill . . . Dwyer reports "Gold and silver legislation is dead for this session of Congress."**

FACTORS in the development of a minerals policy, depressed conditions in the domestic lead-zinc industry and the changing concepts of public land utilization were key topics discussed at the 58th annual convention of the Idaho Mining Association at Sun Valley, July 5-7.

Problems in the mining industry today principally are problems of surpluses and not problems of shortages, John F. O'Leary, staff assistant in the office of the Assistant Secretary of Interior for Minerals, told the convention.

Clark Wilson, chairman of the Emergency Lead-Zinc Committee, declared "it is high time the Administration quit thinking of the lead-zinc industry as a bunch of statistics."

"We are still waiting," Wilson said, "for the Administration to announce a lead-zinc minerals policy, and legislative time in this Congressional year is running short."

O'Leary's view was somewhat different:

"Most of our mineral imports are derived from those countries whose friendship and support we need and covet. Canada is a major supplier. Mexico ranks high, as do Australia, Venezuela and Peru. We not only buy from these countries, our sales to them constitute an important element of our total export trade. It is for reasons such as this that our department is often a lone voice in Government councils when we advocate restrictions on trade in the interest of domestic mining."

O'Leary said proposals such as increased tariffs, more restrictive quotas and/or subsidies would be in direct conflict with one or more of the broad public policies under which the Government functions.

Wilson said legislation sponsored by the Emergency Lead-Zinc Committee which has been introduced in Congress would solve the problems of the producer, consumer and importer and would be the basis for a complete lead-zinc minerals policy. It would provide an increase in tariff rates that would be partially geared to prices of the two metals.

He praised efforts of Senator Clinton Anderson, D-N.M., to get hearings scheduled on Senate Bill 1747, the committee-sponsored legislation.

"The people we represent," Wilson said, request that our friends in Congress insist on a legislative solution to control excessive imports of lead and zinc and this takes precedence over foreign economic aid matters with which our Government has become so preoccupied."

The establishment of wilderness areas and public land withdrawals provided another issue on which convention speakers disagreed.

Roger H. McConnel, chief geologist for Bunker Hill Co. at Kellogg, Idaho lashed out at the program of setting aside "vast wilderness areas for the privileged few." He said most recreational use of national forest areas is by the motoring public in areas which are accessible by road, not in the wilderness areas accessible only on foot or by pack trip.

McConnel said mineral resources are but one part of our national life that is very seriously crippled by the large wilderness withdrawals. He indicated such withdrawals result in loss of payrolls, jobs, taxes, revenue from Federal timber sales and tourist revenue.

The Forest Service, he said, has created regulations which practically prevent mineral exploration of large areas and that no real effort has been made to reasonably assess the mineral potential of the areas which are being withdrawn.

Boyd L. Rasmussen, regional forester for the U.S. Forest Service at Missoula, Mont., outlined the Government's wilderness program.

"The wilderness areas are the same as other national forest land as far as the applicability of the mining laws is concerned," Rasmussen said. "Only portions within such areas might be withdrawn from mineral entry because of outstanding recreational importance and closed to mining claim location."

"Before establishing a wilderness area," he added, "the potential mineral values, as revealed by past prospecting and mining, are carefully considered and weighed against the wilderness values. Those areas that have reasonable certainty of becoming important mineral producers are left out."

**Robert M. Hardy Jr.,** president of Sunshine Mining Co., Spokane, which operates the nation's largest silver mine near Kellogg, Idaho, predicted an increase in the price of silver within the next 12 months.

"The economic and monetary theorists have not yet been able to repeal the law of supply and demand," he declared.

He said that in the United States in the past 10 years production of silver has been about 370-million oz while consumption of the metal by industry and for coinage has totaled 1.4-billion oz, leaving a deficiency of nearly 1-billion oz or an average of about 100-million oz a year.

"It is, therefore, readily apparent to most observers that there is insufficient silver to fulfill the demands of industry and coinage, a circumstance which seems to be recognized by all, with the exception of the United States Treasury, which continues to sell the stocks it needs for coinage and holds the price at an artificially low 91c an ounce," Hardy said.

"If these demands are to be supplied, the source of the additional silver must come from either new mine production, from stocks on hand, or from demonetization of silver now in circulation throughout the world. With stocks decreasing to the point of exhaustion and with a trend toward increased use in coinage, it is then readily evident to an observer that the required silver must come from additional mine production. That will not come about when the price in held down," Hardy said.

"The policy of the U.S. Treasury in continuing to sell off a national asset at an artificially low price is creating another chaotic condition which in all probability will come about next year."

State Senator Jack M. Murphy, of Shoshone, Idaho, the author of "right to work" legislation proposed in recent sessions of the Idaho legislature, told the convention there is a need for legislation which would provide a "bill of rights" for labor that would protect union members, industry and the public from abuses.

He said that common law prohibits one individual from committing violence against another individual, but he added that when two or more individuals join together they are permitted to commit violence under our present labor laws.

**The market outlook** for lead and zinc was outlined by Emmett A. Torney, sales manager for primary metals for National Lead Co.

He said the lead-acid battery is still the number one lead consumer in the U.S. and indicated that a predicted increase in consumption for this purpose has failed to materialize in the past decade because the average life of a battery has been increased by more than 50%. Torney also cited market losses in recent years attributable to substitutes in the cable coverings and pigments industries.

According to Torney, use of lead in the petroleum industry, mainly for the manufacture of tetraethyl lead and tetramethyl lead additives for gasoline, increased 38% between 1950 and 1960 but the annual use is down from the peak set in 1956. He attributed the latter trend to replacement of piston-type airplanes by jets, end of the horsepower race in the auto industry and changes in refining of gasoline.

World producers of lead and zinc, he said, have banded together to provide research and study that will tend to protect present markets and find new uses for the two metals. He said about 50 such projects are now under way.

*(Continued on p 100)*

# *As We Went to Press . . .*

**Beryllium activity continues to increase,** with the main activity centered in the Topaz—Spors Mt. area of Utah where Beryllium Resources Inc. and United Technical Industries are building plants (E&MJ, July p 18). UTI started production last month.

BRI, with its plant a-building, expects to produce beryllium oxide at a competitive cost since its flotation process acts as an upgrader. It, too, is expected to erect a chemical process plant at Delta and ship hydroxide.

- U.S. Beryllium Corp., at Badger Flats, Colo., is increasing beryl production and stepping up the capacity of the concentrator now under construction at the Boomer Mine from 50- to 100-tpd.
- Chemalloy Minerals, Ltd. of Toronto claims 600,000 tons of beryl ore at Bernic Lake in Manitoba.
- FMC Corp. (formerly Food Machinery and Chemical) has acquired option on 126 mining claims in the Spors Mt. area. Drilling on the former John Hedman claims is under way.
- Delhi-Taylor Oil, whose potash development south of Moab is near completion, is also conducting a beryllium search in Utah.

**Pima Mining Co. has begun** a two-year program to expand mine and mill capacity at the mine near Tucson to handle low-grade reserves lying east and northeast of the present pit, where some 20-million tons of 0.65% Cu has been established. Completion is expected at year-end 1963 with the total cost running about $4-million.

**An okay for Hanna Mining Co.'s operation** of iron mines in Minas Geraes State, Brazil seemed more likely at presstime with the announcement that the government has authorized the nation's railroads to make long-term contracts with commercial firms to haul bulk products to port. Hanna has previously requested permission to construct spur lines to permit annual shipment of 3-million tons of ore, with eventual expansion to 10-million tpy.

Hanna has already joined Mineracao Morro Velho in the construction of a $5-million steel-alloy and metallic abrasives plant which will provide work for some of the excess miners of St. John d'el Rey, now operated by Morro Velho.

**Bol-Inca Mining Corp. is shipping its first dredge** to the Kaka River in Bolivia where South American Gold & Platinum is operating a similar facility (E&MJ, December 1960, p 128).

About 1-million cu yd of gravel per year will be treated, with plans already under way for a 5-million cu yd dredge. Under its agreement, Bol-Inca will pay 5% of all gold produced to the government, plus an income tax from 5- to 31%, based on grade of ground.

**The possibility of offshore mining** of phosphorus-containing pebbles became more likely last month with the invitation to the mining industry by the Department of Interior for "nominations of areas for prospective phosphate leasing on the Outer Continental Shelf off the San Diego (Calif.) area."

Collier Carbon and Chemical Corp. "has expressed interest in development" of the pebble phosphate, according to Interior, in an area 40 miles off the coast in about 600 ft of water.

Nominated areas must be identified by leasing block numbers on a map available from the Bureau of Land Management. Each of the 16 blocks mapped contains 5760 acres. A minimum bonus bid of $5 per acre has been proposed.

# WASHINGTON IMPACT

## Highlights

BERLIN CRISIS—There will be no Korea style Government controls—at least for the forseeable future. It's official now. The President's plans outlined in his speech to the nation last month and subsequent amplification by Government experts count on adequate supplies of raw materials already available.

Officials say there are no areas where potential shortages exist. Last year and first quarter 1961 figures are cited as examples. Contractors for the Defense Department, AEC, and NASA last year consumed only 1.1% of steel supplies. During the January-March 1961 quarter, the same rate prevailed. In copper, defense contractors took up 1.9% of total supplies during 1960 with the rate rising to 2.1% during the first months of this year. In aluminum — military, space and atomic needs consumed 3.1% of supplies during last year and this year the percentage only moved up to 3.9% for nickel alloys—the rate runs fairly constant at 20% of supplies. Government contractors took 3.2% of nickel supplies last year and this percentage has edged up to 4.8% this year, even with the Berlin maneuvering gathering steam.

Government purchasing experts claim that under present Berlin defense and procurement plans, the picture for such materials as lead, zinc, molybdenum, tungsten, chrome, titanium, manganese, beryllium, and rare earths is this: there is excess mining and metallurgical capacity and there are heavy surpluses in the Federal stockpile. Only a long, drawn-out national emergency or war would create much of a market impact and defense experts see little likelihood of this for now.

If the Berlin situation, compounding with other situations of a defense nature, keep gathering momentum (and this is not counted on for the rest of the year), there might be some pressure felt in such areas as the high-temperature, corrosion-resistant metals. What to prepare for, though, is the prospect that should tensions increase over Berlin, the President will seek and get higher taxes on corporations and perhaps other economic controls.

MONTEVIDEO MEETING WITH LATIN AMERICANS—Keep an eye on the "compensatory financing" proposals for commodities tossed in by several Latin American delegations at the "Alliance for Progress" economic meeting. U.S. delegates are interested in it. If U.S. and Latin American countries can hammer out an agreement and a detailed set of plans in post-Montevideo work sessions, such items as lead, zinc, tin, copper and other area minerals and metals might be affected.

Here's how the plan would work. It would be on an "insurance policy" basis designed to protect Latin American economies from the violent graph swings in commodities exports (mostly down) so that government economists can effectively work on individual, national long-range economic planning President Kennedy said was a necessity before effective aid could be applied.

Each country would put some money into something called an "international development insurance fund" (or some other name). It would be voluntary. Not all countries would have to join if they didn't want to. Those joining would be compensated if their "insured" commodities took a dive in prices. The compensation would not total the total price drop and would be less and less if the drop continued downward. If the prices of the "insured" commodities happened to go up over calculated long-term insurance norms, then the insured country would have to put some amounts of money back into the development fund kitty. The U.S. will be a major contributor to this—if any kind of agreement can be reached.

The expected Latin American gripes about such items as lead and zinc probably won't come to much, and stand to be shelved by "mutual consent." But, Latin American governments expressed mounting fears that the U.S. Cold War problems focused on Berlin might considerably blunt U.S. economic aid to their countries.

## Commission Witnesses Sum Up Uranium Plans

Uranium concentrate ($U_3O_8$) procurement by the Atomic Energy Commission will drop slowly but surely from now until 1966. New figures show that total Government uranium purchases of $563-million projected for fiscal year 1962 are $73-million less than for the current year and $153-million less than in fiscal 1960.

Witnesses on AEC's raw materials program testified to this decline before the House Appropriations Committee. They said total commitments through AEC's current contracting period of Dec. 31, 1966, are for 129,000 tons of $U_3O_8$, estimated to cost about $2.3-billion. In this period, procurement from 27 U.S. millers will decrease from 17,900 tons in 1962 to about 16,000 tons in 1964 and 1966. Purchases from South Africa and Canada will decline sharply.

The AEC witnesses could think of no changes likely to boost requirements, and send concentrate procurement spiralling as it did in 1958. Jesse Johnson, director of the Commission's Raw Materials Division, said the question of purchases after 1966 was still up in the air. He said that purchases through 1966, however, would cover the Government's needs to the end of 1967.

Fiscal 1962 concentrate procurement is 29,973 tons. The uranium, necessary for production of nuclear weapons and for peaceful applications of nuclear energy, including electricity generation, is divided this way: U.S.—17,900 tons at unit price of $8.29 per lb, Canada—7825 tons at $10.67 per lb, South Africa, Portugal, Australia—4250 tons at $11.45 per lb.

## Administration Backs Subsidies, Not Tariffs

Responding to mounting pressure for a stand on lead and zinc protection and subsidies, the Administration finally came out with a subsidies, "yes"—tariffs, "no," policy declaration. The declaration came out during subcommittee hearings in the Senate and the House.

John M. Kelly, Assistant Secretary, Mineral Resources, Department of Interior, and W. Michael Blumenthal, Deputy Assistant Secretary for Economic Affairs, State Department, made the policy clear before the Senate committee headed by Sen. John A. Carroll (D.-Colo.).

The Senate hearing was interested primarily in a proposal to hike tariffs on lead and zinc imports. Kelly said the Administration "is opposed to any tariff increase on lead and zinc at this time" because "suppliers of lead and zinc to the U.S. are among our strongest allies." Blumenthal gave similar testimony for the State Department.

Observers say that the Administration was trying to hold down talk and possible headlines of lead and zinc tariff hike proposals while the "Alliance for Progress" meeting with Latin Americans was in the limelight. Mexico and Peru —two big lead and zinc producers—will be counted on getting behind President Kennedy's program.

The House subcommittee, headed by Rep. Ed Edmondson (D.-Okla.), is digging more into the Administration's willingness to subsidize small lead and zinc miners for a limited time of three years. Individual payments would be limited to 750 tons of each metal the first year, 500 tons the second year and 250 tons the third year for each miner. Recommended price of 27½¢ set by the Administration for the combined metals is still being debated. The "phase out" plan for small miners, costing some $1.25-million average yearly, is drawing battle from committee members in both the House and Senate who feel the Government's "vitamin pill" idea for a "sick industry" is way too low.

## U.S. Tests Effect of Stockpile Tin Sales

After long deliberation with the State Department on possible political repercussions (especially in Bolivia), the U.S. decided to honor the request of the International Tin Council and offer some of its tin on the market.

The General Services Administration announced in late July that it would accept bids on 500 tons, to be offered in 50 lots of 10 tons each.

Only 500 tons were offered at that time so that its effect on the market could be studied prior to the release of the remaining 3500 tons.

No minimum price was set on the bids which were submitted by telegram (unusual for GSA) because of the hourly market fluctuations.

Market prices at the time bids are received will bear directly on whether GSA accepts or rejects a bid. A GSA official said invitations to bid were sent to all major tin users in the U.S. and bids were to be accepted or rejected on merit (best price).

## Titanium Moves Back Into Space-Age Favor

Titanium might have far-out uses on the fringe of space. Experts from the Federal Aviation Agency, National Aeronautics and Space Administration and the Defense Department, published a report that points to titanium or stainless steel alloys or a combination of both as being the only feasible materials for a heat resistant skin for a new supersonic passenger aircraft now on the drawing boards.

# Labor This Month

BIG STRIKE BALM: It's more of a coincidence than concerted planning by the Kennedy Administration that the search for new weapons to handle national emergency disputes comes at the showdown time in the industry-wide auto negotiations. Nevertheless, President Kennedy's labor specialists, headed by Labor Secretary Arthur Goldberg, are drawing up a list of legislative approaches that could be used by the White House to handle major strikes. Should the United Auto Workers strike the auto producers at the end of this month—when current contracts expire—it would give a substantial push to the Administration's Taft-Hartley Act proposals. Without an auto walkout, which is not anticipated, the emergency strike legislation would wait 'til '62—when the United Steelworkers' turn comes.

The White House wants to be prepared in either case. Thus, it is designing a list of suggestions for Congress that would give the White House the authority to intervene in big strikes without relying solely on the Taft-Hartley 80-day strike-stopping injunction. Here's what the Administration is likely to ask for:

- Authority to send in Federal mediators early if a dispute looks troublesome.
- Permission to name fact-finding boards with or without the right to recommend settlement terms—depending on the dispute.
- Power to directly intervene, possibly by seizure, with retroactive pay orders when a settlement is finally made.
- Power to invoke "cooling off" periods before a strike without the need for a court injunction.

HOFFA'S HOME FOR INDEPENDENTS: The Teamster president's threat to establish a rival labor federation to the AFL-CIO has leaders of unaffiliated unions—including the Mine-Mill and Smelter Workers—guessing about how far he intends to go. Hoffa has already given AFL-CIO leaders an eighteen month deadline to take the truck union back or he'll set up his own broad-based labor organization, combining not only the independent unions but also AFL-CIO affiliates who are unhappy in the "House of Labor." Thus far, his overtures extend only to longshore, laundry and bakery unions. But, if an actual labor war breaks out, the Detroit labor leader may seek to revive talks with Mine-Mill, the International Union of Electrical Workers and others who, a year ago, were thinking of a mutual aid combine.

His first moves, actually, are expected to be directed at transportation unions. Once before, Hoffa tried to woo the railroad unions into a union transportation pact along with longshore, maritime and airline unions.

LABOR'S WHITE HOUSE DISENCHANTMENT: A recent conclave of AFL-CIO leaders revealed the extent of their disappointment with the Kennedy Administration. Though their complaints were somewhat veiled, intentionally, AFL-CIO chief George Meany was especially bitter at the White House for "restraint" in collective bargaining. Particularly, this was viewed as hurting United Auto Workers president Walter Reuther at the bargaining table. There was no disposition to force a break with the Administration, but the union leaders made clear they won't tone down wage demands. Their reaction had one quick result. Administration economists suddenly halted their anti-inflation statements—waiting to see what happens in Detroit. However, if the talks, and results, don't go as expected, it's possible there could be real trouble between Kennedy and the labor officials who backed him so strongly last November.

MINE-MILL GEARS FOR 1962: The one-year contract reached between the Mine-Mill and Smelter Workers with Kennecott Copper Corp. will bring the entire nonferrous industry into bargaining next year. The Kennecott settlement, which brought a 10¢ an hour boost for nearly 5000 Mine-Mill members, were this year's only major nonferrous negotations. Contracts with other producers run out in mid-1962—and will now be joined by Kennecott. This bargaining, incidentally, will coincide with the next round of industry-wide negotiations in the steel industry.

# MARKETS

## Anaconda Property Struck; Others Settle; Administration Bars Lead-Zinc Tariff Aid

THE E&MJ INDEX OF NONFERROUS Metal Prices in July was 120.5% of the 1947-49 average, up slightly from 120.0% in June. Gains in nickel and tin offset an insignificant drop in the domestic copper average. The Metals Use Index July estimate was 106% of the 1950 average, up 1%.

**Labor and political news** dominated the copper market in July. Kennecott Copper Corp. and American Metal Climax settled with Mine, Mill and Smelter Workers by the July 1 deadline without loss of output. With the Kennecott settlement, the market relaxed after several months of apprehension and heavy speculation as to the outcome.

August 1 brought further disruptions. After signing an agreement to continue work for 10 days into August, workers at Anaconda's El Salvador and Potrerillos reneged and walked out knocking out about 6,500 tpm output. Capacity is some 20% higher. An immediate fear was that the company's other properties would strike in sympathy. On August 1 there were few in New York with any idea of how long the walkout might last.

Kennecott's negotiations with United Steel Workers were also snagged. The contract ran through July. USW agreed to continue working while talks continued promising 72-hour notice. The union was offered terms similar to those accepted by Mine-Mill.

In Chile the government there caused a stir by recommending a bill to force U.S. firms to expand output and refine all copper in Chile. The companies would also be required to invest 1% of their taxable income in housing for workers. Chilean Minister of Mines Enrique Serrano relieved critics when he said that the move would not require increased output in a depressed market, only increased installed capacity to produce. Mines would then be geared to market conditions, he said.

July, a vacation month, saw the copper market slow. Prices both in the U.S. and London were steady. Silence in Katanga Province of the Congo lessened chances that civil war would break out and perhaps limit output. The Rhodesian Copperbelt will remain an uncertainty as long as nationals are striving for additional representation. African leaders are set in their resistance to the new constitution despite perfunctory approval by those eligible to vote. A general strike threat should persist in coming months.

**Aluminum statistics** continued to improve. June output rose to 159,092 tons (77.9% of capacity) from 157,544 in May (74.7% of capacity). May shipments of primary were up sharply to 171,356 tons, the best since February 1960. Shipments have exceeded stocks for the past four months pushing stocks down to 252,864 tons. A trend away from a favorable export balance of primary metal was further indicated in May. Imports of 16,777 tons were the highest of the year. Exports were limited to 6,926 tons. Scrap exports were 9,574 tons.

**Critics of the proposed** Government lead-zinc purchase program, discussed on these pages last month, did some reconsidering in July. The Administration's announcement that it would not consider tariff increments—although it was willing to subsidize small miners—helped stimulate this thought. There is still an outside chance that subsidy action will be passed before Congress recesses.

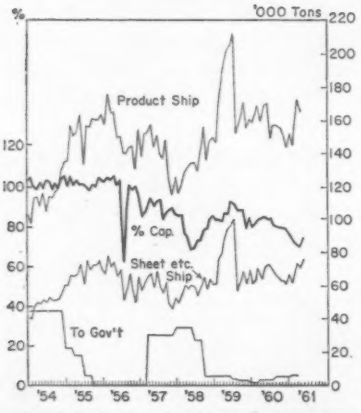
Mexico is working on a commodities "insurance policy" that would insure against large drops in commodity prices. The Mexicans feel they cannot plan their economy if such export items as lead and zinc cannot be charted with steady prices. Insured countries would pay premiums and be compensated if prices fell drastically. The plan will be presented at upcoming "Alliance for Progress" meetings in Montevideo.

E&MJ zinc premiums are currently listed as nominal. Premiums for high purity grades—particularly Special High have been discounted regularly. We are continuing to list book prices issued by sellers. By labeling them nominal we wish to indicate that deals are subject to negotiations; that activity at book prices has been limited. The basic Prime Western price is steady.

American Zinc Co.'s Monsanto, Ill., refinery has been struck since July 6 by Coke and Chemical Workers. About 60,000 tpy is being lost. Progress has been slow.

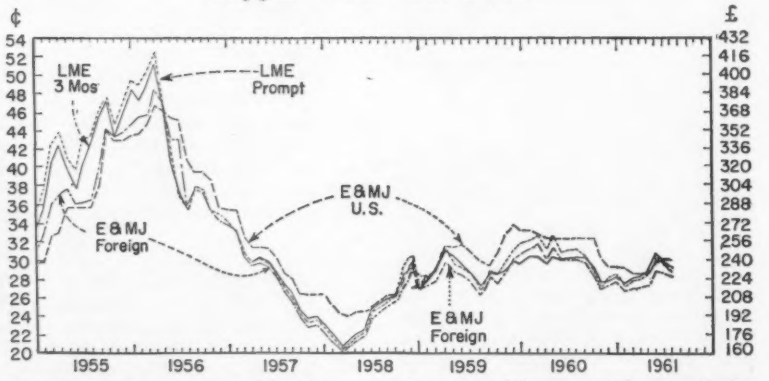
**After long consultation** with the State Department, the Government announced that it would accept bids on 500 long tons of tin, to be sold in lots of 10 tons each. This metal—part of the 4,000 tons previously requested by the International Tin Council—was produced by the once Government-owned Texas City smelter. General Services Administration is offering only 500 tons at this time to test its effect on the market, and the remaining 3,500 tons should be put up for sale shortly. The N.Y. price eased slowly through the month, but rallied in the closing week to reach 117c.

### U.S. Aluminum




The left hand scale shows the percentage of capacity. "% cap." (heavy line) indicates the operating rate of U.S. primary plants; capacity is based on data releasd by aluminum firms and output on Aluminum Assn. figures. "Product ship" refers to U.S. Census data on shipments of aluminum mill products and of aluminum castings — products made from secondary and imported aluminum are included. "Sheet etc. ship" refers to Aluminum Assn. data on sheet, plate and foil. "To Gov't" refers to U.S. primary aluminum shipped to the U.S. Government. Annual figures for 1953-56 are estimated; 1957-59 are public. Monthly allocation of annual amounts is based on information (not specific tonnages) then current on changes in amounts taken by the Government. Data through May, except for shipments to Government and product shipments which are through April.

### Copper Prices 1954-1961




Monthly averages. E&MJ weighted averages are computed from actual reports of sales to E&MJ — normally 140,000 to 170,000 tons per month. LME prices are the average of the mean of the bid and asked; they refer to long tons. The two scales are equal at an exchange rate of $2.80 per £. £320 is 40c a lb, etc. Data through July 1961.

## Average Prices July (E&MJ Quotations)

Cents per lb unless otherwise indicated:

| | |
|---|---|
| **Copper:** | |
| Electro, domestic refinery .... | 30.600 |
| Electrolytic, exports refinery .. | 27.873 |
| Electrolytic, c.i.f. Cont'l ports . | 28.818 |
| **Lead:** | |
| Common, New York ..... | 11.000 |
| Common, St. Louis ..... | 10.800 |
| **Silver:** | |
| Silver, New York, per oz. .... | 91.375 |
| Silver, London, pence per oz. . | 79.518d |
| **Zinc:** | |
| Prime, Western, East St. Louis | 11.500 |
| Prime, Western, delivered (g) . | 12.000 |
| **Tin:** | |
| New York Straits ..... | 116.231 |
| **Gold,** per oz., U.S. price ... | $35.000 |
| **Sterling Exchange** ..... | 278.737 |
| **Quicksilver, per flask** .....| $194.800 |
| **Antimony,** (E&MJ) (d) .... | 36.250 |
| **Antimony,** bulk, Laredo .... | 32.500 |
| **Antimony,** in cases, Laredo . | 33.000 |
| **Antimony** for, 99% (h) .... | 28.125 |
| **Palladium,** troy oz. ..... | $24.000 |
| **Platinum,** refined, per oz. .. | $82.000 |
| **Cadmium** (a) ..... | 160.000 |
| **Cadmium** (b) ..... | 170.000 |
| **Al** 99½% unalloyed ingot . | 26.000 |
| export, ingot ..... | 23.250 |
| **Magnesium,** ingot ..... | 35.250 |
| **Nickel** (f) ..... | 81.250 |
| **Bismuth** ..... | $2.250 |
| **Cobalt** ..... | $1.500 |

Domestic quotations, unless otherwise stated are in cents per lb. Sterling exchange checks, in cents. Quick-silver per flask of 76 lb.
(a) Per lb delivered, ton lots.
(b) Per lb delivered, small lots.
(d) Domestic 5 tons or more but less than carload lots, packed in case f.o.b. New York.
(f) Contract price, f.o.b. Port Colborne U.S. duty included.
(g) Delivered where freight exceeds 0.5c.
(h) 2c duty extra.

## Free Gold Market

Gold sales in international markets rose 12½% during July, pushing bar prices back up to their January level. Coin prices increased 1% to 1½% as hoarding purchases in Europe, the Near East and Asia showed more activity. Gold futures were very strong. London, unwilling to sell one year contracts, listed six month deliveries at around 6% against dollars and Swiss offers were obtainable at about 4¾% to 5% p.a. against Swiss francs, also only for six month delivery. Combined daily volume for London and Zurich increased sharply to over 1¼-million dollars. Minor U.S. gold losses were reported during the second half of the month. Pick's World Currency Report quotes on "free gold" per fine oz as follows:

| | Coins | | Bars (12.5 kg) | |
|---|---|---|---|---|
| | June 30 | July 31 | June 30 | July 31 |
| New York transit | .... | .... | $35.10 | $35.15 |
| Manila | $41.35 | $41.60 | 36.00 | 36.25 |
| Hong Kong | 48.65 | 47.65 | 39.50 | 39.00 |
| Bombay | 56.30 | 57.00 | 53.00 | 53.25 |
| Beirut | 39.90 | 40.65 | 35.26 | 35.37 |
| Paris | 40.17 | 41.25 | 35.62 | 35.65 |
| Buenos Aires | 40.75 | 41.25 | 36.40 | 36.50 |

Note: Prices are quoted at the free or black market value of the U. S. dollar in the local markets.

## Custom Smelter Copper

Based on flat price and E&MJ average price sales in U.S. for month of July reported by American Smelting & Refining Co. electrolytic copper in standard shapes, adjusted to nearest ⅛¢; ¼¢ deducted for selling common.

| | |
|---|---|
| Delivered consumer's plant | 30.750 lb |
| F.o.b. refinery ..... | 30.350 lb |

## Major Metals

### U.S. DAILY AND AVERAGE PRICES

Cents per lb unless otherwise indicated:

| July 1961 | Electrolytic Copper (a) Domestic | (b) Export | Europe c.i.f. (e) | Lead New York | Lead St. Louis | Zinc (f) Delivered | Zinc East St. Louis | Aluminum Unalloyed Ingot 99% | Straits Tin New York |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 30.600 | 28.025 | 28.970 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 115.875 |
| 4 | Holiday | 27.800 | 28.745 | Holiday | | | | | |
| 5 | 30.600 | 27.700 | 28.645 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 117.750 |
| 6 | 30.600 | 28.075 | 29.020 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 117.250 |
| 7 | 30.600 | 27.875 | 28.820 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 117.000 |
| 10 | 30.600 | 27.900 | 28.845 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 117.125 |
| 11 | 30.600 | 27.875 | 28.820 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 116.875 |
| 12 | 30.600 | 27.850 | 28.795 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 116.500 |
| 13 | 30.600 | 27.900 | 28.845 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 116.500 |
| 14 | 30.600 | 27.900 | 28.845 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 116.250 |
| 17 | 30.600 | 27.600 | 28.545 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 115.250 |
| 18 | 30.600 | 27.650 | 28.595 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 115.250 |
| 19 | 30.600 | 27.725 | 28.670 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 115.250 |
| 20 | 30.600 | 27.725 | 28.670 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 115.625 |
| 21 | 30.600 | 27.875 | 28.820 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 115.750 |
| 24 | 30.600 | 27.875 | 28.820 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 115.250 |
| 25 | 30.600 | 28.200 | 29.145 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 115.500 |
| 26 | 30.600 | 27.850 | 28.795 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 115.625 |
| 27 | 30.600 | 27.800 | 28.745 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 116.000 |
| 28 | 30.600 | 27.975 | 28.920 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 117.000 |
| 31 | 30.600 | 28.150 | 29.095 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 117.000 |
| **AVERAGES FOR MONTH** | | | | | | | | | |
| July | 30.600 | 27.873 | 28.818 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 116.231 |
| **AVERAGES FOR WEEK** | | | | | | | | | |
| July | | | | | | | | | |
| 5 | 30.600 | 28.075 | 29.020 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 117.063 |
| 12 | 30.600 | 27.915 | 28.860 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 116.950 |
| 19 | 30.600 | 27.755 | 28.700 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 115.700 |
| 26 | 30.600 | 27.905 | 28.850 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 115.550 |
| **CALENDAR WEEK AVERAGES** | | | | | | | | | |
| July | | | | | | | | | |
| 7 | 30.600 | 27.895 | 28.840 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 116.969 |
| 14 | 30.600 | 27.885 | 28.830 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 116.650 |
| 21 | 30.600 | 27.715 | 28.660 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 115.425 |
| 28 | 30.600 | 27.940 | 28.885 | 11.000 | 10.800 | 12.000 | 11.500 | 26.000 | 115.875 |

THE above quotations for major nonferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered U.S. basis add 0.400c per pound, the average differential for delivery charges.

(b) Export copper daily quotations are weighted averages based on sales outside the U.S. reported to E&MJ. Ocean freight and 0.125c lighterage and handling are deducted to arrive at the f.o.b. Atlantic seaboard refinery quotation. On f.a.s. U.S. sales lighterage of 0.125c is deducted.

(c) The daily silver quotations reported by Handy & Harman, in cents and fractions of a cent per troy ounce, is the price paid by Handy & Harman in settlement for silver contained in unrefined silver-bearing materials submitted to them for refining. It is determined on the basis of offers of bar silver .999 fine as made to Handy & Harman for nearby delivery at New York by regular suppliers in quantities sufficient to meet daily requirements, and it is usually 0.250c below the price at which such offers are made.

The Treasury's purchase price of newly mined domestic silver is 90.5c per troy ounce 1000 fine effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U.S. Treasury's gold price is $35. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

(e) The c.i.f. Continental ports quotation is arrived at by adding to the f.o.b. export quotation lighterage, and the standard conference freight and insurance. Atlantic ports to main Continental ports. Currently at 0.125c and 0.82c.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingots; Cathodes are sold at a discount of 0.125c to 0.15c per pound. Quotations for zinc are based on Prime Western brands. Zinc in New York commands a premium over the St. Louis bas's equal to the freight differential. Contract prices for High Grade zinc delivered in the East, Middle West and West effective Apr. 1, 1960, commanded a premium of 1.50c per pound over the current market for Prime Western: Special High Grade 1.75c effective Apr. 1, 1960.

(f) Prime Western delivered where freight from E. St. Louis exceeds 0.500c.

Quotations for lead are based on domestic common lead. Corroding lead commands a premium of 10 points (almost all U.S. lead is corroding grade).

## Silver, Gold and Sterling

### DAILY AND AVERAGE PRICES

| July 1961 | Silver (c) New York | Silver London | Sterling Exchange | Gold (d) London |
|---|---|---|---|---|
| 3 | 91.375 | 79.375d. | 278.8666 | 251s. 6¾d. |
| 4 | Holiday | 79.375d. | Holiday | 251s. 7½d. |
| 5 | 91.375 | 79.375d. | 278.7400 | 251s. 8¾d. |
| 6 | 91.375 | 79.375d. | 278.6325 | 251s. 10¼d. |
| 7 | 91.375 | 79.375d. | 278.5475 | 252s. ¼d. |
| 10 | 91.375 | 79.375d. | 278.5760 | 251s. 11d. |
| 11 | 91.375 | 79.375d. | 278.4550 | 252s. ½d. |
| 12 | 91.375 | 79.375d. | 278.4860 | 252s. ¾d. |
| 13 | 91.375 | 79.375d. | 278.5180 | 252s. 2d. |
| 14 | 91.375 | 79.375d. | 278.4420 | 252s. 2d. |
| 17 | 91.375 | 79.375d. | 278.6160 | 252s. 1¾d. |
| 18 | 91.375 | 79.375d. | 278.6000 | 251s. 11½d. |
| 19 | 91.375 | 79.625d. | 278.6160 | 252s. 1¾d. |
| 20 | 91.375 | 79.625d. | 278.5240 | 252s. 3d. |
| 21 | 91.375 | 79.625d. | 278.4280 | 252s. 4½d. |
| 24 | 91.375 | 79.750d. | 278.5440 | 252s. 3½d. |
| 25 | 91.375 | 79.750d. | 278.9250 | 252s. 2¼d. |
| 26 | 91.375 | 79.750d. | 279.2475 | 251s. 9½d. |
| 27 | 91.375 | 79.750d. | 279.2575 | 251s. 8¾d. |
| 28 | 91.375 | 79.750d. | 279.2360 | 251s. 9d. |
| 31 | 91.375 | 79.750d. | 279.4800 | 251s. 6½d. |
| **AVERAGES FOR MONTH** | | | | |
| July | 91.375 | 79.518d. | 278.737 | — |
| **AVERAGES FOR WEEK** | | | | |
| 5 | 91.375 | — | 278.802 | — |
| 12 | 79.375 | — | 278.539 | — |
| 19 | 79.375 | — | 278.558 | — |
| 26 | 79.375 | — | 278.734 | — |

Calendar Week Averages: New York Silver: July 7, 91.375; July 14, 91.375; July 21, 91.375; July 28, 91.375

# MARKETS *(Continued)*

## London Metal Exchange Quotations

| July 1961 | Copper Cash Bid | Copper Cash Asked | Copper 3 Mon. Bid | Copper 3 Mon. Asked | Lead Current Month Bid | Lead Current Month Asked | Lead 3 Mon. Bid | Lead 3 Mon. Asked | Zinc Current Month Bid | Zinc Current Month Asked | Zinc 3 Mon. Bid | Zinc 3 Mon. Asked | Tin Cash Bid | Tin Cash Asked | Tin 3 Mon. Bid | Tin 3 Mon. Asked |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 229½ | 229¾ | 233½ | 233¾ | 65⅛ | 65⅜ | 66¼ | 66⅝ | 77¾ | 77⅞ | 79 | 79⅛ | 911 | 912 | 916½ | 917 |
| 4 | 228½ | 228¾ | 233¼ | 233 | 64⅝ | 65 | 65½ | 66 | 78 | 78⅛ | 79⅛ | 79¼ | 910 | 912 | 915 | 916 |
| 5 | 231½ | 231¾ | 235¼ | 235½ | 65 | 65¼ | 66¼ | 66⅜ | 78⅛ | 78⅜ | 79⅜ | 79¾ | 921 | 922 | 926 | 927 |
| 6 | 230 | 230¼ | 234¼ | 234½ | 64⅝ | 64⅞ | 66 | 66⅛ | 78⅛ | 78⅛ | 79⅜ | 79⅛ | 916 | 917 | 924 | 925 |
| 7 | 229¼ | 229½ | 233¼ | 233½ | 64¼ | 64½ | 65⅜ | 66 | 77½ | 77⅝ | 78⅝ | 78⅞ | 916 | 917 | 923 | 924 |
| 10 | 230¼ | 230½ | 234¼ | 234½ | 63⅞ | 64 | 65¼ | 65⅜ | 77 | 77⅛ | 78⅛ | 78½ | 914 | 916 | 924 | 925 |
| 11 | 230½ | 230⅝ | 234⅜ | 235 | 64 | 64¼ | 65⅛ | 65½ | 77¼ | 77⅜ | 78¼ | 78⅝ | 918 | 919 | 928 | 929 |
| 12 | 229½ | 229¾ | 233¾ | 234 | 63⅝ | 63¾ | 65⅛ | 65¼ | 77⅛ | 77¼ | 78¼ | 78⅜ | 914 | 915 | 925 | 926 |
| 13 | 228 | 228¼ | 233 | 233⅛ | 64⅛ | 64¼ | 65⅜ | 65⅛ | 77¼ | 77⅛ | 78⅛ | 78⅜ | 911 | 912 | 924 | 925 |
| 14 | 227½ | 228 | 232 | 232⅜ | 64½ | 64⅝ | 66 | 66⅛ | 77⅜ | 77¾ | 78⅝ | 78¾ | 910 | 911 | 922 | 923 |
| 17 | 227¼ | 228 | 232 | 232¾ | 65 | 65⅛ | 66⅛ | 66⅜ | 77⅜ | 78 | 79⅛ | 79¼ | 907½ | 908 | 918 | 918½ |
| 18 | 227¾ | 228 | 231¾ | 232 | 64⅛ | 64⅝ | 65⅜ | 66 | 77½ | 77¾ | 78⅛ | 79 | 906 | 907 | 917 | 918 |
| 19 | 227½ | 227¾ | 230½ | 230¾ | 64½ | 64⅝ | 65¾ | 65⅞ | 77⅝ | 77¾ | 78⅛ | 79 | 908 | 909 | 918 | 919 |
| 20 | 228 | 228½ | 231⅛ | 231⅜ | 65 | 65¼ | 66⅛ | 66⅛ | 77¾ | 78 | 79⅛ | 79⅜ | 912½ | 913 | 923 | 923½ |
| 21 | 231 | 231¼ | 234 | 234½ | 65⅛ | 65½ | 66⅜ | 66½ | 78 | 78⅛ | 79¼ | 79⅜ | 912½ | 913 | 923½ | 924 |
| 24 | 230¾ | 230½ | 233⅛ | 233¾ | 65¼ | 65½ | 66⅛ | 66⅝ | 78⅛ | 78⅜ | 79¼ | 79⅜ | 909 | 910 | 921 | 922 |
| 25 | 231 | 231¼ | 234 | 234¼ | 65⅜ | 66⅛ | 66⅞ | 67 | 78⅛ | 78¾ | 79½ | 79⅝ | 914 | 915 | 924 | 925 |
| 26 | 228¾ | 229 | 232½ | 232¾ | 65 | 65½ | 66 | 66⅛ | 78 | 78⅛ | 79⅛ | 79¼ | 909½ | 910 | 924 | 925 |
| 27 | 229½ | 229¾ | 233¼ | 233½ | 65 | 65⅛ | 66¼ | 66⅜ | 78 | 78⅛ | 79⅛ | 79⅜ | 915 | 915½ | 929 | 929½ |
| 28 | 230¾ | 231 | 234¼ | 234½ | 65 | 65⅛ | 66⅛ | 66⅜ | 78⅛ | 78⅛ | 79¼ | 79½ | 920 | 921 | 933½ | 934 |
| 31 | 233¾ | 234 | 236½ | 236¾ | 65⅞ | 66 | 66¾ | 66⅞ | 78½ | 78⅝ | 79½ | 79⅝ | 922½ | 923 | 935½ | 936 |
| Av'g's | £229.685 | | £233.482 | | £64.854 | | £66.104 | | £77.893 | | £79.042 | | £913.690 | | £923.940 | |

Prices are for the official a.m. session in pounds sterling per ton of 2240 lb. Copper wire basis bars, lead 99.0%, zinc 98% and tin min. 99.7%.

## Miscellaneous Metals, Ores, Minerals

Quotation cover wholesale lots, prompt shipments, f.o.b. New York unless otherwise stated. tons of 2,000 lb unless otherwise noted. st—short ton; lt—long ton; stu—short ton unit; ltu—long ton unit. (p) duty extra.

### MISCELLANEOUS METALS

July 31, 1961

| | | |
|---|---|---|
| Aluminum ingot, 99.9% lb | | 28c |
| Antimony, spot, lb, less than carload, in cases | | 36.250c |
| In bulk, carload lots, f.o.b. Laredo | | 32.5c |
| Imported, 10 ton min. (p), 99% Duty not paid | 28c — | 28.25c |
| Bismuth, ton lots, lb | | $2.25 |
| Cadmium, ton lots delivered, lb | | $1.60 |
| small lots | | $1.70 |
| Calcium, lb, ton lots, 98%, cast | | $2.05 |
| Chromium, 99.8% grade, lb, contract delivered | $1.15 — | $1.19 |
| Cobalt, 97 to 99%, per lb effective 3-1-60 | | $1.50 |
| Germanium, per gram, 10,000 gram lots | (d)28.15c—(c)(d)29.95c | |
| Indium, troy oz | $1.35 — | $2.25 |
| Lithium, lb, 98% | $9.00 — | $11.00 |
| Nickel, cathodes, lb (a) | | 81¼c |
| Other sales, regular sellers | | 81¼c |
| Sales by dealers, etc. | | 81¼c |
| Magnesium, 99.8% carloads, lb producer's plants, Velasco, Texas, effective Apr. 16 | | 35.25c |
| Palladium, troy oz | $24 — | $26 |
| Platinum, troy oz | $80 — | $85 |
| Quicksilver, flask of 76 lb. 25 flasks or more | $192 — | $195 |
| Selenium, 99 plus %, lb—(Feb. 19, 1958) | $6.50 — | $7.50 |
| Silicon, minimum 98%, carloads, lb | | 19c |
| Hyper-pure: rod per kilo | $385 — | $407 |
| Tellurium, lb | | $5.25 |
| Thallium, 100 lb or more | | $7.50 |
| Titanium, 99.3% plus, grade A-1, max. 3% Fe, lb (b) | $1.50 — | $1.60 |

(a) Effective July 1, 1961; including U. S. duty; (b) Effective Aug. 1, 1959. (c) Delivered; (d) f.o.b. plant.

### METALLIC ORES

| | | |
|---|---|---|
| Beryllium ore, imported, 10% BeO, (b) stu; spot | $32 — | $33 |
| term contracts | $34 — | $34.50 |
| Chrome ore per long ton, f.o.b. cars Atlantic ports, dry: | | |
| 44% $Cr_2O_3$ no ratio | (a)$19.75 — | $20.50 |
| 48% $Cr_2O_3$ 3 to 1 ratio | $35¼ — | $38 |
| Iron ore, Lake Superior, Lower Lake ports, lt | | |
| Old Range bessemer | | $11.85(e) |
| Mesabi bessemer | | $11.60(e) |
| Mesabi non bessemer | | $11.45(e) |
| Lead (Galena), 80%, Joplin, Mo., ton | | $125.16 |
| Manganese ore—Per ltu of Mn basis 48%, nearby positions, subject to premiums and penalties, c.i.f. U. S. ports import duty extra., (n)87c—90c. Long-term contract nominal. | | |
| Molybdenum ore, 90%, per lb of Mo f.o.b. mines | | $1.40 |
| Columbium-Tantalum, per lb, combined oxides 10 to 1 ratio | $1.18 — | $1.25 |
| Tungsten ore, per stu of $WO_3$: | | |
| Foreign 65%, c.i.f. U. S. ports, duty extra | $16.00 — | $16.50 |
| U. S. scheelite, f.o.b. mill | $22 — | $24 |
| Vanadium ore, per lb of contained $V_2O_5$ f.o.b. mines | | 31c |
| Zinc ore, Prime, 60% concentrate, Joplin, Mo., per ton | | $68 |

(a) Nominal. (b) c.i.f. U. S. ports. (e) Effective 1958 shipping season.

### METALLIC COMPOUNDS

| | | |
|---|---|---|
| Arsenous oxide (arsenic trioxide) lb, in bbl, carload lots N. Y. docks | | 4c |
| Cobalt, oxide, 72½% to 73½%, per lb, effective Mar. 1, 1960 | $1.15 — | $1.18 |
| Copper sulphate, 100 lb, effective 5-17-61 | | $12.50 |
| Germanium dioxide, gm | | 16¼c |
| Molybdic trioxide, technical, per lb of Mo | $1.59 — | $1.60 |
| Imported, including 37c duty | $1.75 — | $2.05 |

### ALLOYS

| | | |
|---|---|---|
| Ferrochrome 65 to 70%, per lb of Cr, (4-9% C) | | 28¼c |
| Ferromanganese, 74 to 76%, per lb shipping point | | 11c |
| Ferromolybdenum, 58 to 64% Mo. lb of Mo contained | $1.63 — | $1.95 |
| Ferrosilicon, 50% per lb of Si f.o.b. shipping point | | 14.60c |
| Ferrotungsten, 72 to 82%, lb of W contained | | $2.25 |
| Ferrovanadium, per lb of V delivered | $3.20 — | $3.40 |
| Silicomanganese, max. 1½% C, lb contracts | | 11.6c |
| Spiegeleisen, per lt, 19-21% grade | $98 — | $101 |

### NONMETALLIC MINERALS

| | | | | |
|---|---|---|---|---|
| Asbestos, f.o.b. Canada (Quebec) mines (Canadian funds) ton: | | | | |
| Crude No. 1 | $1,400–$1,725 | | Paper stock | $120–$142 |
| Crude No. 2 | $750–$1,155 | | Waste | $75–$86 |
| Spinning Fibers | $370– $600 | | Shorts | $40– $75 |
| Shingle fibers | $180– $220 | | | |
| Asbestos, f.o.b., Vancouver, B. C. (Canadian funds): | | | | |
| Crude No. 1 | $1,522 | | Spinning fibers | $470–$787 |
| Asbestos, Vermont, f.o.b. Morrisville: | | | Shingle fibers | $142–$325 |
| Spinning fibers | $353– $408 | | Waste, stucco or plaster | $86 |
| Shingle stock | $181– $218 | | Refuse or shorts | $41– $75 |
| Paper stock | $120– $142 | | | |
| Barytes, f.o.b. cars: | | | | |
| Georgia, crude, per ton | | | | $18 |
| Missouri, 94%, $BaSo_4$, per st | | | $16 — | $18 |
| Crude oil well grade, min. 4.3 sp gr, st (a) | | | | $18 |
| Imported, c.i.f. Gulf Ports, st | | | $12½ — | $14 |
| Bauxite, st, f.o.b. point of shipment: | | | | |
| Imported metallurgical, per lt, f.o.b. Br. Guiana, 60% $Al_2O_3$, 6% $SiO_3$, 1.25% Fe, 1-1-60 | | | | $7.25 |
| Feldspar, bulk ton; f.o.b. plants: | | | | |
| Potash or soda feldspar, 200 mesh, ceramic grade | | | $17 — | $20.50 |
| Glass feldspar, white, 20 mesh | | | | $9 |
| Fluorspar, f.o.b. mines, bulk, 72½% effective, ton | | | $37 — | $41 |
| 60% effective $CaF_2$ | | | $33 — | $36 |
| Acid 97% concentrate, bulk, ton f.o.b. Ill. | | | $45 — | $50 |
| Fuller's earth, f.o.b. Georgia or Florida, ton | | | $7.00 — | $14.00 |
| Magnesite, per ton dead-burned, bulk, f.o.b. Washington | | | | $46 |
| Mica—Domestic, f.o.b. mines, Punch 7c-12c per lb according to size and quality. Sheet clear 1½x2 in, 70c-$1.10; 2x2 in, $1.10 to $1.60; 2x3 in; $1.60-$2.10; 3x3 in, $1.80-$2.30; 3x4 in, $2.00-$2.60; 3x5 in, $2.60-$3.00, 4x6 in, $2.75-$4.00; 6x8 in, $4.00-$8.00. Wet ground, very fine, $140-$155 per ton, Bulk sales, dry ground; $30-55 per ton. Scrap $20-$30. | | | | |
| Ocher, Georgia, ton in sacks | | | $26.50 — | $32.00 |
| Sulphur Mexican, for use in Mexico, metric ton, f.o.b. mines, depending on location | | | $21 — | $23 |
| For export f.o.b. vessel, depending on grade | | | $22.50 — | $23.50 |
| Actual prices received by U. S. producers approximate the Mexican export prices. | | | | |
| Talc, f.o.b. works, ton: | | | | |
| New York, purified | | | $18.00 — | $20.00 |
| Vermont, extra fine | | | | $12.50 |
| Tripoli, Missouri, ton: | | | | |
| 40-mesh, cream colored | | | | $50.00 |

(a) Some restricted sales at $11.50; (b) Corrected; (c) Nominal.

### IRON AND STEEL

| | | |
|---|---|---|
| Pig iron, gross ton, basic, Valley furnaces | | $66.00 |
| Steel, f.o.b. Pittsburgh, billets, net ton | | $80.00 |
| Structural shapes, Pa., Ala., etc., 100 lb | $5.30 — | $5.50 |

# TIMBERED AREA COLLAPSED... BUT YIELDABLE ARCHES HELD

Here's a dramatic example of Yieldable Arches doing their job. Men were re-timbering the roof in the foreground when a large fall occurred. The tunnel was destroyed in the timbered area, right up to the edge of the Yieldable Arch installation. The Arches yielded, and sagged a bit . . . but they held!

One look at the picture, and you can't help wondering how such relatively slim members could support the crushing weight. The answer is: it's not the *strength* of the Yieldable Arch that does the trick, it's the *give*. By yielding a little at a time, the Yieldable Arch gives the overburden a chance to arch over and establish equilibrium, thus in large measure sustaining itself.

A Yieldable Arch set is built up of three or more U-shaped rolled-steel segments which nest together at the ends to form a friction joint. Stout U-bolt clamps secure this joint and hold it fast under normal loads. Excessive pressures will overcome the friction in the joint, however, permitting the Arch to give gradually. Horizontal struts act as spacers and provide lateral rigidity to the structure.

Most mines have found that Yieldable Arches pay for themselves in their first year of service. They can be installed by your own men, and have high salvageability. Let one of our engineers discuss them in detail with you.

Just get in touch with our nearest office.

Steel — *for Strength ... Economy ... Versatility*

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
*Export Sales:* Bethlehem Steel Export Corporation

**BETHLEHEM STEEL**

BETHLEHEM STEEL

# there's new life in the old Bird Dog Mill

Eagle Picher's Central Mill is the source for much of the feed which will be trucked to the Bird Dog Mill for treatment. One of America's largest lead-zinc concentrators and among the first plants to install HMS to preconcentrate ore, it is located in an area that has been mined continuously from about 1848. Tailings from early operations have been retreated two or three times as improved mineral dressing methods have been developed.

## Eagle Picher Develops New Treatment Scheme Using Cyanamid Reagents to Recover Lead-Zinc Values from High-Tar Slime Ponds

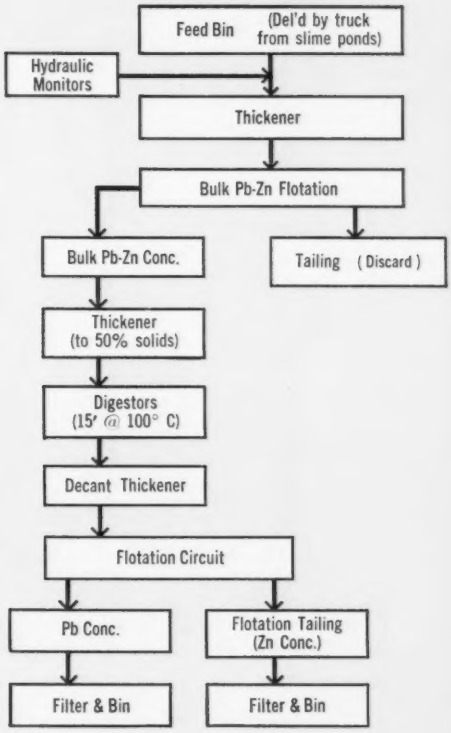
Eagle Picher, using a treatment scheme developed by their own metallurgists, is now capable of separating lead-zinc minerals from slime ponds even though feed is essentially all minus 10 microns and slimes are very high in a tarry petroleum material.

These ponds represent tremendous feed thickener overflow accumulations too fine to settle in the years before synthetic flocculants were available. High tar content had precluded separation by selective flotation.

Treatment will be carried out at the Bird Dog Mill, first custom mill in the Tri-State Mining District, which has been shut down since 1932 when the larger Central Mill was completed.

Basically, the process consists of making a bulk flotation concentrate which, after being cleaned and thickened, is subjected to a 15-minute digestion period at the boiling point with 75 to 100 lb. sodium metasilicate per ton of bulk concentrate. The clear liquid containing many of the dissolved impurities is then decanted and the galena is successfully floated away from the sphalerite, using AERO Xanthate 343 and cyanide.

**THE EAGLE PICHER CO.**
Bird Dog Slime Retreatment Plant
Abbreviated Flowsheet




**METALLURGICAL RESULTS**

| | % Zn | % Pb |
|---|---|---|
| Feed | 7.91 | 4.07 |
| Zn Conc. | 52.64 | 1.60 |
| Pb Conc. | 8.42 | 52.66 |
| Rougher Tailing | 2.28 | 1.75 |

**REAGENT USE**

| Reagent | lb./ton of feed | added to: |
|---|---|---|
| AERO® Xanthate 343 | 0.30 | Bulk Rougher |
| Copper Sulfate | 3.22 | Bulk Rougher |
| Sodium AEROFLOAT® Promoter | 0.71 | Bulk Rougher |
| MIBC | 0.14 | Bulk Rougher |
| Sodium Metasilicate | 8.20 | Digestor |
| 96/98 NaCN | 1.07 | Pb-Zn Separation |
| AERO® Xanthate 343 | 0.14 | Pb-Zn Separation |
| SUPERFLOC 16® Flocculant | 3#/day | Feed thickener, when required |


CYANAMID

AMERICAN CYANAMID COMPANY
EXPLOSIVES AND MINING CHEMICALS DEPARTMENT
BOUND BROOK, NEW JERSEY

Cyanidation Process Chemicals • Flotation Reagents
Flocculating Agents
Film Forming Agents • Surface Active Agents
* * * * *
High Explosives • Permissibles
Seismograph Explosives
Blasting Agents • Blasting Caps
Electric Blasting Caps • Blasting Accessories

# Specify Anaconda all Butyl Shovel Cable

This new shovel cable—the toughest in the industry—cuts shovel downtime. Months of torture testing throughout the country have proved it.

It endured the rugged cold of the Mesabi and the punishing heat of Florida's phosphate mines.

It was twisted, kinked, soaked, crushed and run over.

Its new Butyl *jacket* is the reason for this extra durability in the face of the effects of ozone and moisture and extreme physical punishment.

It is especially compounded to combine flexibility at low temperatures with thermal stability at high temperatures.

Here are other construction features which contribute to this cable's unequalled service record:

1. Anaconda's rubber-core grounding conductors offer a cushioning effect which minimizes pinching and wire breaking and offers greater ground contact protection.
2. Special shielding—a combination of copper cross-braided with cotton—eliminates chafing (and makes splicing faster and easier too).
3. Insulation is a special high-grade Butyl that withstands ozone, heat, and moisture.

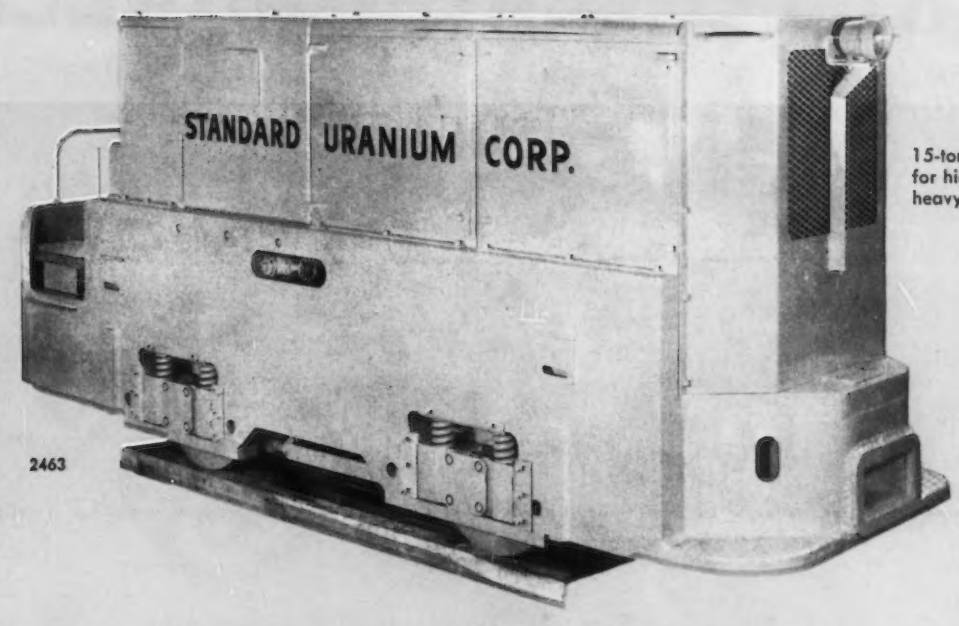
Check all the features of this job-proved new shovel cable—they add up to extra cable life, less downtime, and dollar savings. Contact Department EFL-1-PQ, Anaconda Wire and Cable Company, 25 Broadway, New York 4, N. Y.

61255

ASK THE MAN FROM

**ANACONDA®**

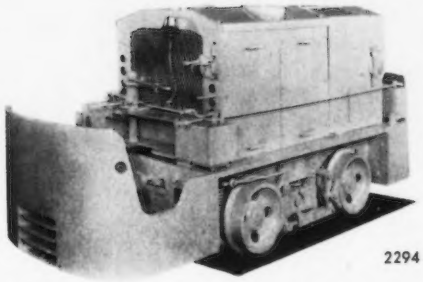
ABOUT ALL-BUTYL SHOVEL CABLE



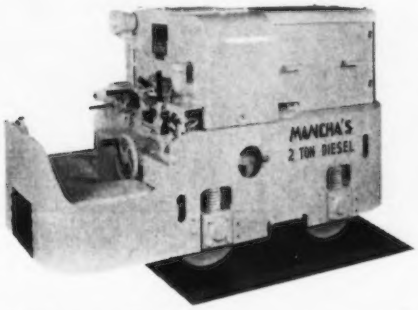

15-ton main-liner for high speed and heavy tonnages.

*Mine or tunnel, heavy loads or light*

# MANCHA diesels can do it!




A 6-ton unit for hauls from remote areas where trolley or battery locomotives are impractical.




2-ton trammer for light duty in small mines and tunnels. 2306

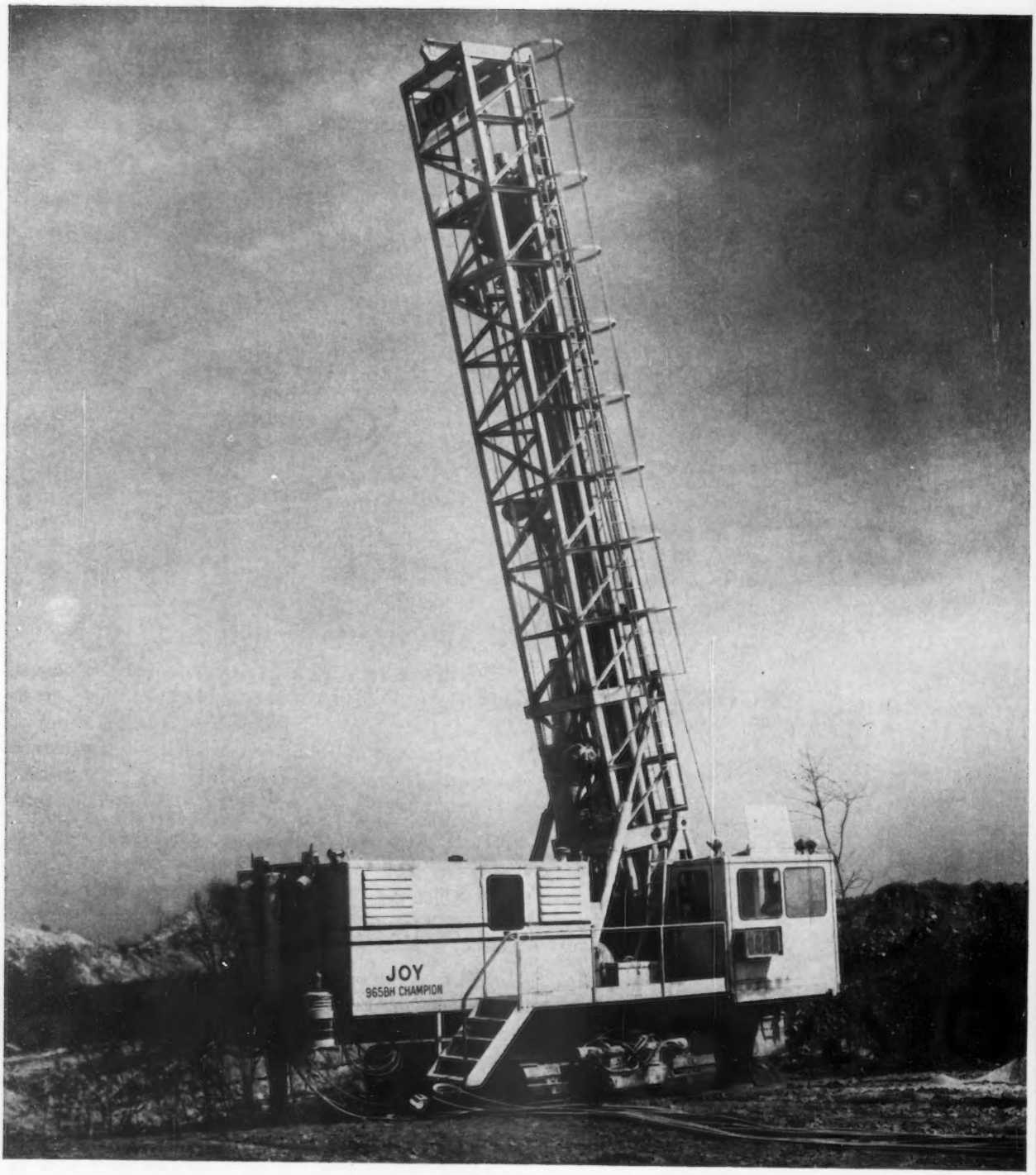
No matter what your haulage job—mine or tunnel, heavy loads or light—Mancha's highly efficient, cost-reducing, diesel-powered locomotives are engineered to help you do it better. All models are designed to minimum dimensions. Operation is simple. Accessibility for routine maintenance easy. Job life excellent, 24-hour service assured.

In addition, with Mancha you can benefit from our engineering service—which you'll get without cost or obligation of any kind. Based on their experience, our engineers will make recommendations to give you the best haulage efficiency at the lowest possible cost.

Whether you're in the market today or will be in the future, you should know about the economies you can expect from Mancha diesel-powered locomotives. Wide range of sizes . . . from 2 tons to 20 tons operating weight.

**MANCHA LOCOMOTIVE**
DIVISION GOODMAN MANUFACTURING COMPANY
Halsted Street and 48th Place • Chicago 9, Illinois
Cable Address: Mancha, Chicago
Mancha representatives are located in principal mining areas throughout the world.

# EVERY FEATURE YOU NEED



# FOR LOWEST COST DRILLING

# JOY 965-BH CHAMPION

### ANGLE HOLES OR VERTICAL HOLES

The 965-BH has a power-operated mast that tilts back to 30° from vertical for angle-face drilling—or remains vertical for conventional drilling. In either position, all machine elements used directly in drilling are attached to the mast—overhead drive, rod racks, breakouts, etc. Thus, angle-face drilling is practiced as easily as vertical drilling.

### DRILLS OFF THE END OR OVER THE SIDE

Set-ups and moves from hole to hole are faster and safer because the entire drill swings 360° independently of the crawlers. Where holes are close to the highwall the 965-BH may tram parallel to the face with the mast swung at right angles to the crawlers. There is no need to squirm the crawlers or back in and out of the face. The entire operation is made much safer and faster.

### OVERHEAD DRIVE

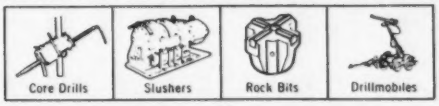
A unique electric overhead drive eliminates chucking; permits continuous drilling with 30-foot rods. The drive has four gear ratios to match the torque and speed to drilling conditions. Rotation speeds are variable from 0 to 120 rpm and down-pressure is variable up to 65,000 pounds.

### PUSH BUTTON SHIFTING

All drilling functions are controlled from a master control panel inside the operator's cab. Gauges and illuminated signals show performance of all machine operations—rpm, down-pressure, air pressure. The operator can gear down to higher torque ratios simply by turning a knob—there are no levers, pedals or gear shifts. Operator and machine performance stays high because fatigue is eliminated, response is instant.

These unique features represent the most advanced concepts in large hole rotary drilling. Your Joy representative can give you full details on how the 965-BH can fit into your pit or stripping operations. For complete information, write for Bulletin 3496-4.

**EQUIPMENT FOR MINING ... FOR ALL INDUSTRY**




**JOY**

**Joy Manufacturing Company**
**Oliver Building, Pittsburgh 22, Pa.**

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

Shock-Fortified Firestones

# ADD TIRE POWER TO TASK FORCES!

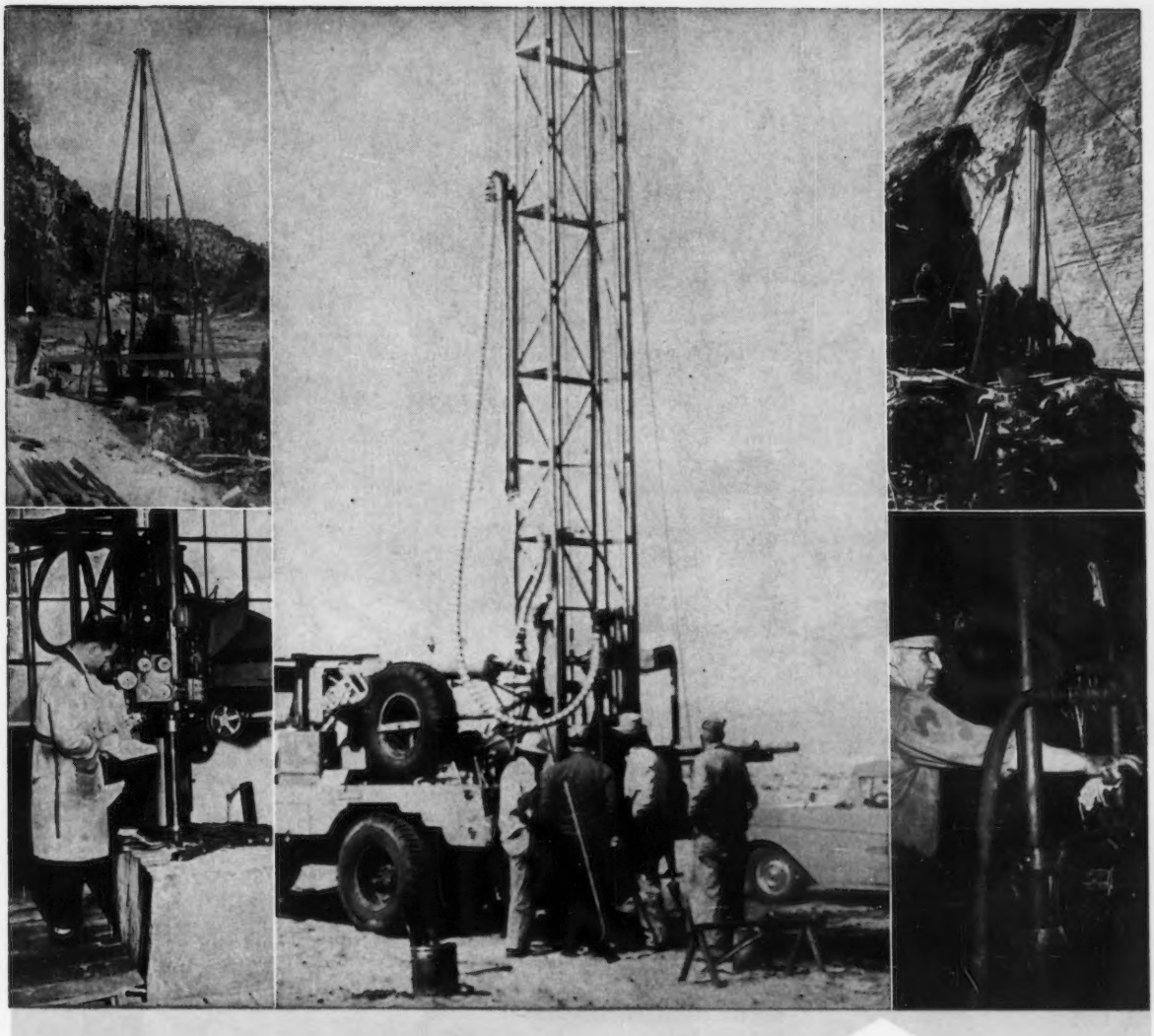
You'll beat downtime and add to profits when your quarry trucks roll on Firestone SUPER ROCK GRIP DEEP TREAD tires. Shock-Fortified nylon cord bodies armor these rugged tires against haul impact to keep your quarry equipment working. Extra cut-resistance is built into Firestone quarry tires, too, with long-wearing Firestone Rubber-X. This exclusive cord-body and rubber combination gives your quarry trucks new staying power under big loads, in the roughest conditions. Put Firestone tires on your quarry equipment—and get the backing of fast, on-the-job service—from your nearby Firestone Dealer or Store.

**Always Specify Firestone Tires When Ordering New Equipment.**

**Firestone**

**FIRST IN OFF-THE-HIGHWAY TIRE NEEDS**

*Copyright 1961, The Firestone Tire & Rubber Company*



**Operate at "Less cost per foot" . . .**

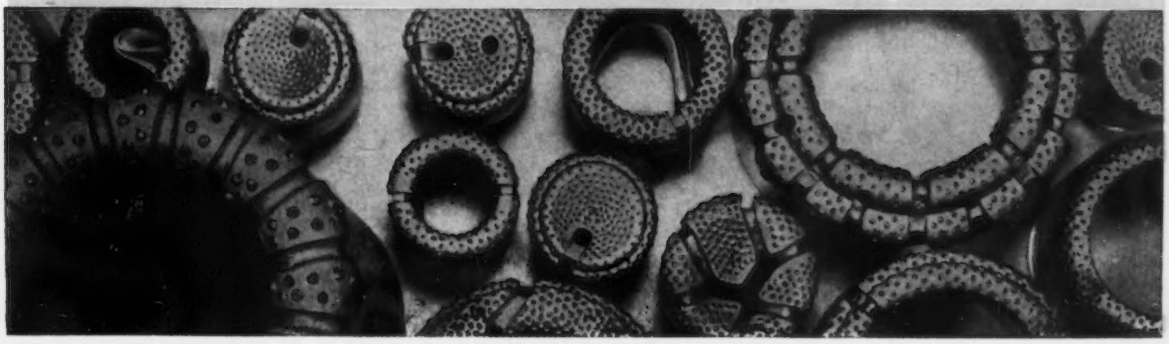
. . . with Christensen diamond bits and core barrels "engineered" for your particular drilling problem. Experienced field consultants are available regardless of your job location or scope of operations.

*"Less cost per foot"*

**CHRISTENSEN DIAMOND PRODUCTS**

MAIN OFFICE AND PLANT 1937 SOUTH 2nd WEST
SALT LAKE CITY, UTAH

SERVICE FROM WORLD-WIDE SALES OFFICES AND MANUFACTURING PLANTS



# LE ROI LRD-2 for low cost, powerful rotary drilling

*rotary or down-the-hole drilling ... gas or diesel*

*These rigs come on tires or tracks!*

Here's a highly portable blasthole drill for drilling holes up to 4½ inches as deep as 30 feet... equipped for either positive-drive rotary drilling or powerful down-the-hole percussive drilling.

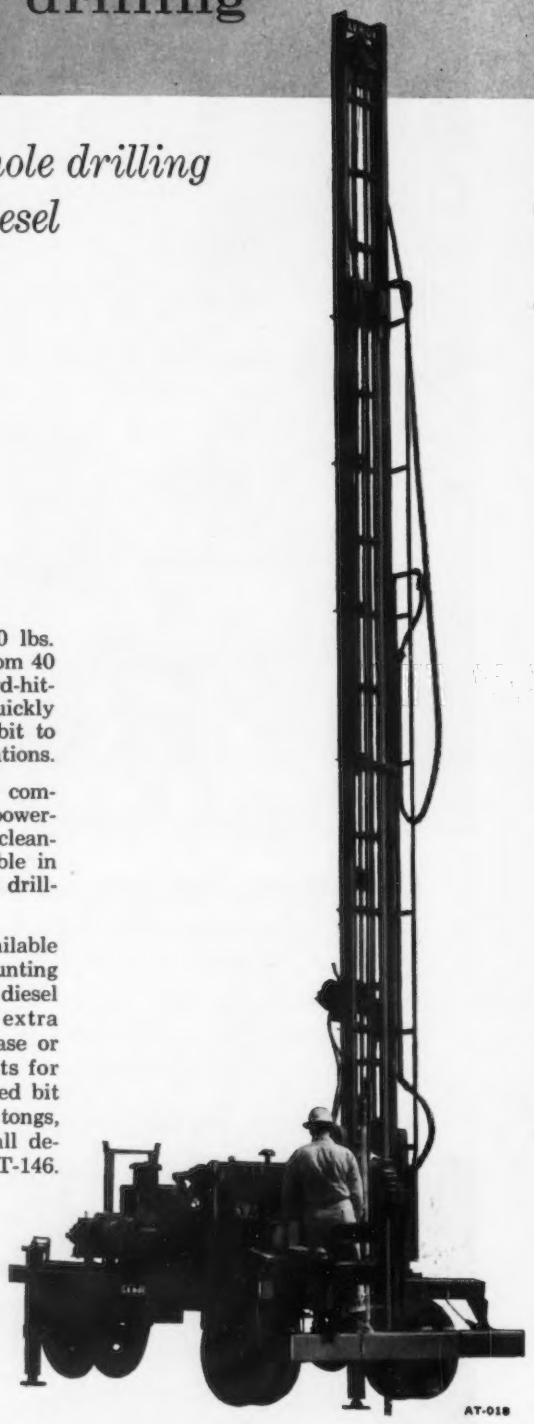
What's more, the LRD-2 is completely self-contained... and economically priced, too!

The entire unit is easily handled by one man. Controls are conveniently grouped at an operator's station located alongside the drilling area. The unit can be moved, leveling jacks hydraulically set, mast hydraulically raised, drill pipe and bits connected, and hole started all with a few nonfatiguing motions.

Powerful direct mechanical drive keeps the rotary table turning — won't bog down or lose torque under rough going like air or hydraulic driven units — eats through tough rock formations under 10,000 lbs. pulldown pressure at speeds from 40 to 250 rpm. If necessary, a hard-hitting down-the-hole drill can quickly be substituted for the rotary bit to drill extremely hard rock formations.

A Le Roi 25 hp two-stage air compressor provides ample air for powering the down-the-hole drill and cleaning out hole . . . or is available in single-stage where only rotary drilling is necessary.

The self-propelled LRD-2 is available either on crawler or tire mounting and with either gasoline or diesel power unit. A whole list of extra equipment is available to ease or speed drilling, including lights for night-time operation, a mounted bit grinder, air hoist, breakout tongs, water injection system, . . . all detailed in Specification Sheet AT-146. Write for your copy.



AT-018

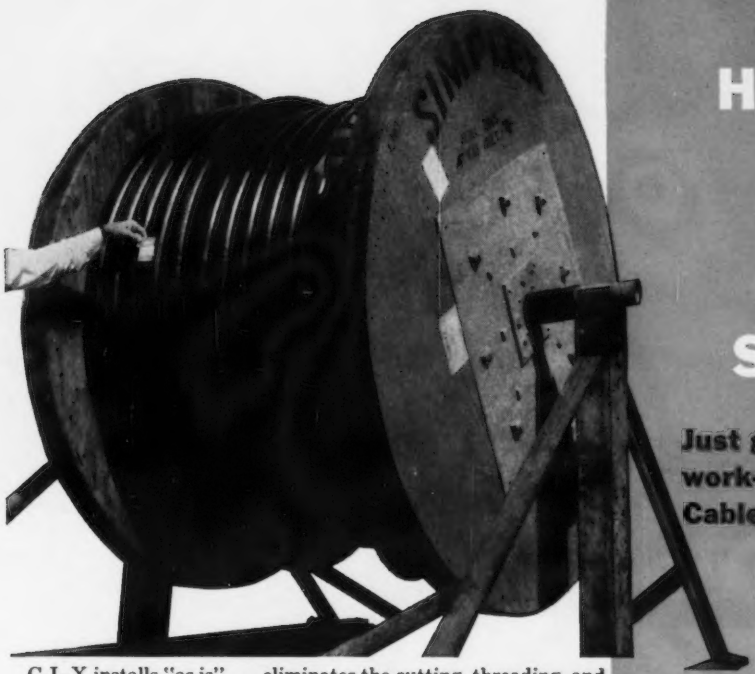
**LE ROI**

division of Westinghouse Air Brake Co.

Sidney, Ohio

# HOW MUCH MONEY COULD C-L-X SAVE YOU?

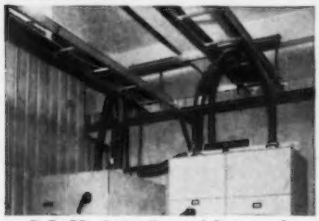
**Just glance at these time-and-work-saving features of C-L-X Cable Systems by SIMPLEX.**



C-L-X installs "as is" . . . eliminates the cutting, threading, and pulling operations necessary with conventional duct or conduit.

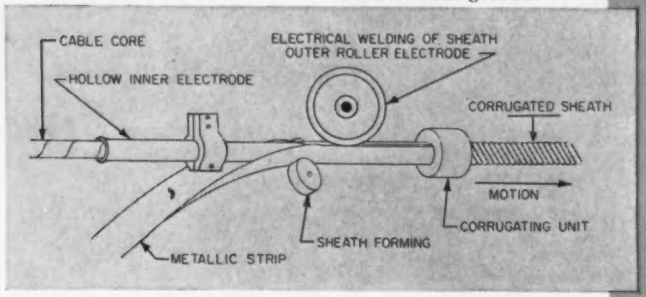
C-L-X is pliable . . . can be handled smoothly on a standard size reel.

C-L-X is easily trained anywhere, in continuous, long-length runs.



C-L-X installs without the need for benders, sand, elbows, or similar fittings.

C-L-X is versatile. It can be installed with clamps, in trays or ladders, or directly buried in the ground.

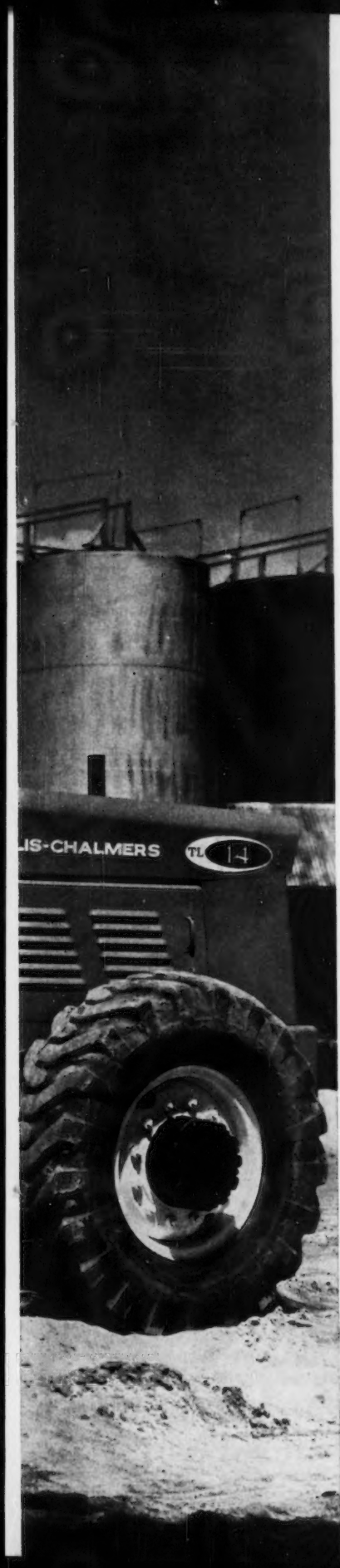



How C-L-X is made.

You'll see how easily this packaged *combination* of cable and pliable, impervious metallic sheath installs. You'll see why it cuts installation cost to a fraction of that required for conventional cable and duct. Then *find out* how much money today's easiest-to-install cable system can save you.

C-L-X is available with plastic-jacketed sheaths of steel and with sheaths of aluminum, bronze, or copper — with or without plastic jacket. It's the choice of chemical plants, oil refineries, paper mills, utilities, industrial plants — wherever severe environmental conditions exist. Write today for your free, illustrated brochure on C-L-X.

**Simplex**
**WIRE & CABLE CO.**
Cambridge, Massachusetts • Newington, N.H.




# DUMP CYLINDERS STAY OUT OF THE DIRT

**On all Allis-Chalmers tractor loaders dump cylinders are placed near the center of gravity, out of the dirt and grit that can score piston rods . . . damage entire hydraulic system.**

Instead of mounting dump cylinders on the bucket, Allis-Chalmers puts them up and away from abrasives that can cause scoring of piston rods or get into vital hydraulic components and ruin the entire system. In addition, this dump cylinder location brings greater loader stability . . . no extra weight to lift with bucket . . . fewer moving parts.

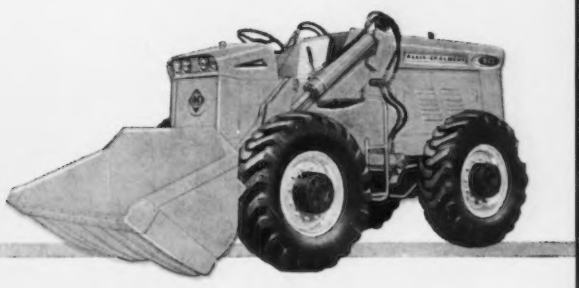
Other tractor loader advantages you'll like are: *Single lever speed and direction control; pin-connected axles* that hold tight under load; *extra stability* from extra-long wheelbase; *high lift—added reach* for fast, even dumping even into side-boarded trucks; and *5-way hydraulic filtering* protection that means less downtime . . . extended loader life.

Watch Allis-Chalmers loaders at work. Be convinced of their many design and construction advantages that improve your profit picture. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

*Allis-Chalmers offers 6 tractor loader models—ranging in power from 76.5 to 184 horsepower—in carry capacity from 3,600 to 10,500 lb and with buckets available from 1 to 6 cu yd.*

*STEP UP YOUR*

**P**erformance
**O**perator comfort
**W**earability
**E**ase of maintenance
**R**eliability



WITH **ALLIS-CHALMERS**
*POWER FOR A GROWING WORLD*

***Crush more tons per dollar . . .***

# BUY REPLACEMENT PARTS FROM THE COMPANY THAT BUILT YOUR CRUSHER

You buy a crusher because of the engineering experience the manufacturer has put into it to give you more production for your money. In the same way, the manufacturer of your crusher buys the experience and engineering abilities of the company which supplies certain components and replacement parts for it. The manufacturer profits only when *you* are satisfied with the performance of his product. That's why most big-name crushing equipment manufacturers work closely with AMSCO to give you replacement parts that fit perfectly, assure original equipment performance, and last a long time in the toughest conditions.

When it comes to wear parts, here's why most manufacturers insist on AMSCO. As long-experienced specialists in wear-resistant metals, AMSCO *engineers* alloys to exact formula needed to stand up under the abrasion-impact-pressure crushing conditions of your job. AMSCO cast parts are structurally perfect and contain the proper alloys for longest possible life.

AMSCO parts are patterned from manufacturer's drawings. They are built for *your* crusher . . . not copied from inaccurate field measurements. When you need mantles, concaves, jaws, rolls, plates or liners, get them from the manufacturer who built your crusher. He depends on AMSCO's experienced way with wear-resistant alloys *to help you crush more tons per dollar.*

*They're backed by experience...*

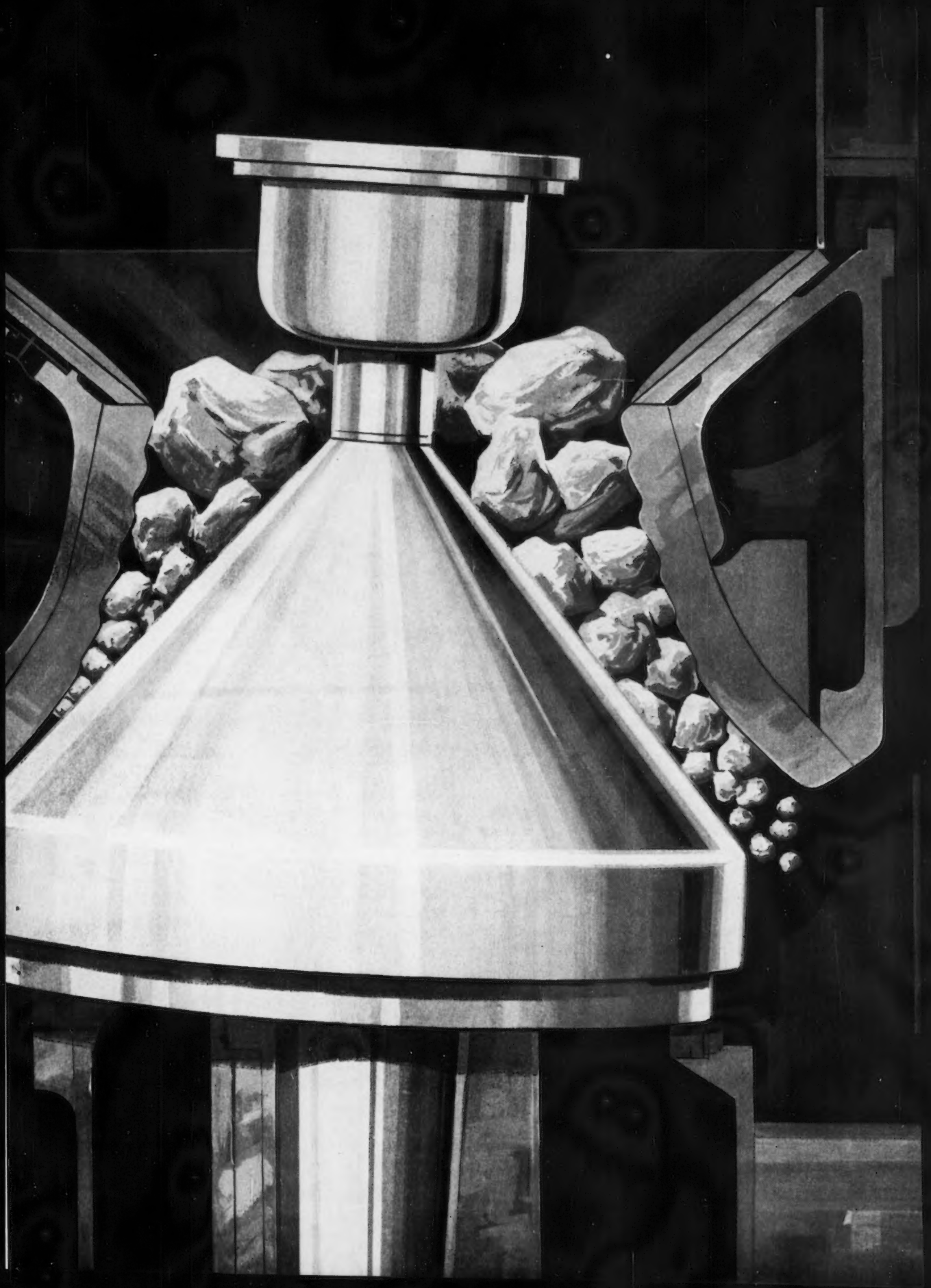
**AMSCO**

AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS, ILLINOIS

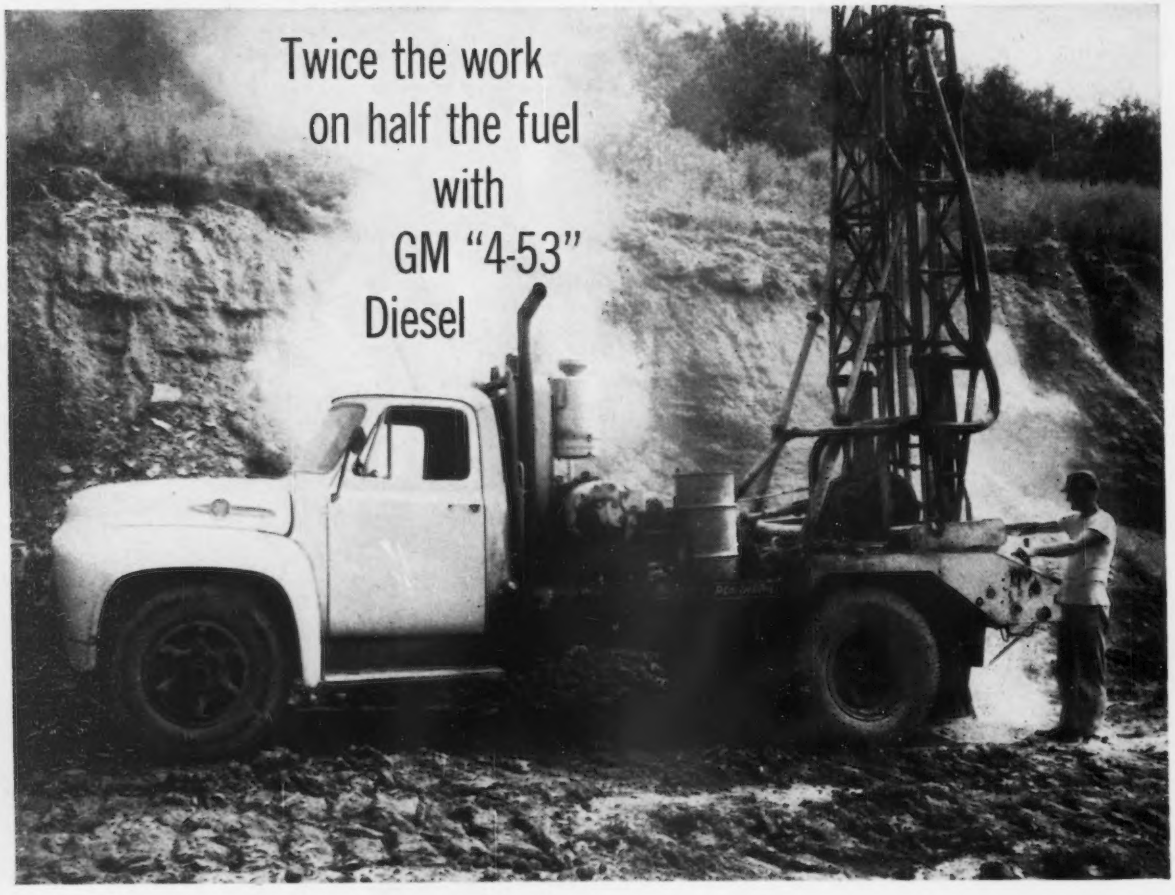
AMERICAN Brake Shoe COMPANY

Other Plants in:
Denver • Los Angeles • New Castle, Del. • Oakland, California • St. Louis
IN CANADA: Joliette Steel and Manitoba Steel Foundry Divisions
IN MEXICO: Amsco Mexicana, S. A.

161



# GET REAL PRODUCTIVITY—GET A GM DIESEL




"Since we converted our Winter-Weiss Drill to '4-53' GM Diesel power, production has gone from 180-200 ft. per day to 350-400 ft. per day, and we use only half the fuel," says Mr. Paul Carapellotti, Secretary of Anthony Mining Company, Steubenville, Ohio.

That's the kind of profit-making productivity you can look for when you repower your gasoline-driven equipment with a Series 53 "Jimmy" Diesel.

But increased production and lower fuel costs aren't the only savings. "Before we switched to the '4-53'," says Mr. Carapellotti, "we couldn't get a hole drilled without a lot of costly repairs. Now we're in business to drill! We've never had any downtime in over a year of heavy going and the only part replacement has been an air cleaner."

Higher productivity . . . reduced fuel consumption . . . lower fuel costs . . . less downtime . . . more work per man-hour . . . these are the pay-offs that help you beat today's profit-squeeze.

Put a Series 53 "Jimmy" Diesel to work for you! They're available in 2, 3, 4, and 6V models, from 20 to 195 H.P. And they're built to the same rugged standards as their bigger, mine-proved brothers, Series 71 GM Diesels.

For the whole moneysaving story, see your nearby GM Diesel Distributor. His only business is engines and he's set up to service what he sells. Look for him in the Yellow Pages under "Engines, Diesel."

GM DIESEL

DETROIT DIESEL ENGINE DIVISION,
GENERAL MOTORS, DETROIT 28, MICH.

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario
Parts and Service Worldwide

## GM DIESEL ALL-PURPOSE POWER LINE sets the standard of Diesel productivity

# New M-S-A® Pager gives you the convenience and flexibility of a telephone with the amplification of a loud speaker

Now, with one versatile communications unit, you can page key personnel over a loud speaker or converse semi-privately by phone. A flip of the switch on the new M-S-A Pager lets you do either.

### Uses Existing Lines

The new unit is a completely self-contained, transistorized telephone. Individually battery-powered, these units utilize existing phone lines, and can be used in conjunction with most other telephones.

### Simultaneous Paging

Ten or more Pagers can be installed on a single line. This makes it quite simple to page key men from a number of points . . . simultaneously. Once the man answers, a flip of the switch converts the Pager into a regular telephone for private or semi-private conversing.

### 24 Volts for Paging . . . 12 Volts for Talking

Two dry cell batteries provide the power source. And the power is expended only when the unit is in use, thus conserving battery life. Estimated battery life: 2 to 3 months on a 5% duty cycle.

### Easy Installation and Maintenance

Weighing about 25 pounds, the M-S-A Pager can be mounted on a timber or a rib. All parts readily accessible with removal of four fastening screws which open the front half of the case. Transistors are vibration-proof . . . no filaments . . . so high efficiency, long life are assured.

For additional information, ask the MSA representative to call. And write us for helpful new product data bulletin.

Mine Safety Appliances Company, Pittsburgh 8, Pennsylvania. In Canada: Mine Safety Appliances Company of Canada, Ltd., 500 MacPherson Avenue, Toronto 4, Ontario, Canada.

**MINE SAFETY APPLIANCES COMPANY** MSA

# How USS Amerclad mining machine cable got to be the best

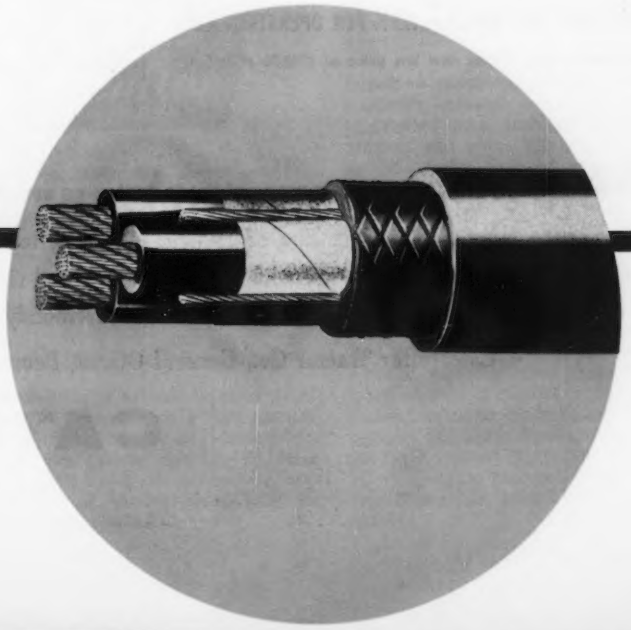
Amerclad cable is the toughest electrical cable you can buy. That's why it's used on so many continuous coal mining machines. You can drag it over rocks, around sharp corners, through mud and oil, and you'll still have a long way to go before the smooth, high density neoprene jacket shows any wear. It is vulcanized in a continuous lead sheath for maximum toughness. Another reason Amerclad Cable is the best: dynamic balancing of the high quality, annealed copper conductors to eliminate unequal tension and elongation without sacrificing flexibility. Bend it, twist it, jerk it —almost nothing fazes Amerclad Cable in mine face service. We build USS Tiger Brand Amerclad Cable to such high standards because we know that in a tough, cost conscious business like coal mining, you can't afford a weak link in your production. You can't afford less than the best.

For every special job there's a standard USS Tiger Brand Electrical Wire and Cable. For the complete story on Amerclad Cable or any other, write American Steel and Wire, Dept. 1186, 614 Superior Avenue, N.W., Cleveland 13, Ohio.

*USS, Tiger Brand and Amerclad are registered trademarks*

**American Steel and Wire**
**Division of**
**United States Steel**

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Alabama, Southern Distributors
United States Steel Export Company, Distributors Abroad



## Special report to users of Caterpillar equipment

CAT CATERPILLAR

Parts you can trust
...cost less per hour

# New Cat parts stretch dollars "down where the digging's going on"

That's more than just talk! More and more users are conducting their own field trials of ground engaging tools—tips, bits, teeth and edges—to determine which brand gives them the best performance-cost balance. And time after time, they find that genuine Caterpillar ground engaging tools outclass all comers—in production and over-all economy!

Take Cat cutting edges. These edges have been contractor-tested with most of the market's leading brands all over the country. Results: Cat edge wear life—10-60% longer. Cat edge cost—15-50% less per hour. Think of that in terms of dollars!

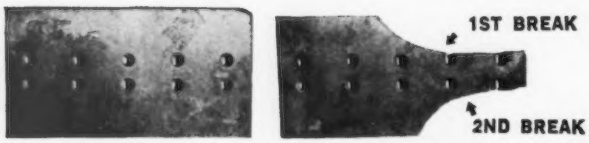
### HERE'S A LOOK AT RECENT FIELD TRIALS ON SCRAPER CUTTING EDGES:

Two DW21-470 Scrapers, one with Cat *standard* edges and one with popular brand *thick* edges, were put to work "side-by-side" by a contractor in hard, red clay on an Interstate Highway job. His findings:

| Brand | Price | Hours of Life | Cost per Hour |
|---|---|---|---|
| Other | $121.22 | 1060 | $.114 |
| Cat | $128.28* | 1360 | $.094 |

**HIS SAVINGS WITH CAT EDGES—17.5% PER OPERATING HOUR**

*Test completed before recent new low price of $102.30 effective.




CATERPILLAR OTHER BRAND

A Cat ⅞" stinger and another brand *one inch thick* were split in half and a section from each installed on *same* DW21-470 Scraper working in decomposed lava with embedded basaltic boulders. Other brand section broke after 48 operating hours, was reversed but broke again two hours later—a total of 50 hours of life. *Cat edge wear during period was ¼", other brand ½".*

**Your Caterpillar Dealer has the facts on many of these tests—go over them with him and start to save more now.**

Caterpillar continually up-dates its line of ground engaging tools. Some of the newcomers to the line that "stretch your dollars" are: new self-sharpening end bits and ripper tips, patented reversible router bits, and new-design scarifier teeth for Motor Graders. These new money-savers keep production high, costs down.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U. S. A.

**CATERPILLAR**

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

# TODAY'S PATENTS

*Tomorrow's technology*

OLIVER S. NORTH

## U.S. PATENTS

### Exploration

**Method for detecting the presence of sulphide orebodies** by ascertaining the phase angle between the charging current and the voltage at a pair of pick up electrodes and/or the apparent complex conductivity of the orebody in terms of the frequency of the sinusoidal charging current caused to flow through the ground. A. W. Love, R. W. Baldwin and A. A. Brant, assigned to Newmont Mining Corp. U.S. 2,988,690.

### Metal & Mineral Processing

**Design for a rotary apparatus** for the reduction of pelletized iron oxide ores to produce either a metallized product for subsequent smelting or a fully reduced metal for direct use in steelmaking operations. A. J. Jones. U.S. 2,986,457.

**Recovery of iron from fayalite or similar slags.** The slag is charged onto a pool of molten iron and blown with lime and a preheated hydrocarbon gas. Iron in the slag migrates to the molten pool. A. F. Johnson, assigned to Strategic Materials Corp. U.S. 2,986,458.

**Copies of U.S. patents can be purchased at 25c each from Commissioner of Patents, Washington 25, D.C.**

**Method for smelting chromite ore** or blends of chromite and iron oxide ores to produce low-carbon chrome-iron master alloys suitable for processing into a variety of steels. M. C. Udy, assigned to Strategic-Udy Metallurgical & Chemical Processes, Ltd. U.S. 2,986,459.

**Method for producing from iron oxide ore** in a rotary kiln a partially reduced product highly suitable for making briquettes to be used in open-hearth steelmaking furnaces. D. E. Babcock, R. M. Drews and S. R. Crooks, assigned to R-N Corp. U.S. 2,986,460.

**A low-cost collector** for use in the froth flotation beneficiation of phosphate rock, barite, fluorspar, cement rock, magnesite, spodumene, ilmenite, hematite, magnetite, chromite, and like ores consists of a saponified tall oil pitch. W. T. Bishop, assigned to Hercules Powder Co. U.S. 2,987,183.

**An integrated, relatively compact machine for sintering iron ores** or the like on pallets, and cooling, crushing, and screening the sintercake product. P. J. Homan, assigned to Koppers Co., Inc. U.S. 2,987,307.

**Process for producing a potassium-enriched aluminosilicate useful as a ceramic raw material.** Feldspar or the tailing produced in the electrostatic beneficiation of a microline-perthite pegmatite ore is admixed with potassium sulphate and carbon, and the mixture heated and leached with water. A. N. Baumann, assigned to International Minerals & Chemical Corp. U.S. 2,987,405.

**Improved "twin cleaning" heavy media process** for concentrating mineral values in feeds consisting of particles of a wide range of sizes. The usual demagnetization step is replaced by a centrifugation step. G. B. Walker, assigned to American Zinc, Lead & Smelting Co. U.S. 2,988,-212.

**Apparatus and method for simultaneously conveying ore pellets** from a pelletizer to a sintering machine and compacting the pellets to increase their strength and pick up loose material. Broken pieces are screened out. K. Meyer, assigned to Dravo Corp. U.S. 2,988,781.

**An improved concentrator of the reciprocating wet-sluice trough type** for concentrating values from alluvial or crushed ores of precious metals, copper, tungsten, thorium, lead-zinc, beryllium, etc. E. F. Gobatti. U.S. 2,989,184.

**Roasting of pyrites ores containing oxides of copper, lead, or silver, to produce a material amenable to concentration by froth flotation.** Minus 10-mesh ore is roasted at 500-800° C. in the presence of common salt and water vapor to convert the oxide minerals to sulphides. L. J. Bechaud, Jr., and H. Hartjens, assigned to Newmont Exploration, Ltd. U.S. 2,989,394.

**Improved apparatus for sintering ore charges in suction draft sintering machines,** wherein uniform sintering is obtained across the width of the bed. The effect of shrinkage of the charge which

takes place during the sintering operation is avoided by providing horizontally-extending overlap strips at the level of the top of the charge. K. Meyer, assigned to Dravo Corp. U.S. 2,989,395.

## CANADIAN PATENTS

### Metal & Mineral Processing

**In the smelting of ilmenite** or other titaniferous iron oxide ores in a blast furnace, part or all of the limestone flux is replaced with sodium chloride or other alkali metal halide to produce a low-melting slag. R. A. Halversen. May 16, 1961. Canadian 620,070.

**Dressing of asbestos** rock whereby the fibers are not excessively broken. The rock is fed into an air vortex circulating in a crushing space. This vortex conducts it past primary and secondary fragmentation means, and the fiber and waste rock are then separated by centrifugal force and discharged tangentially. E. Andreas. May 16, 1961. Canadian 620,105.

**Low-temperature reduction of hematite, limonite, and other iron oxide ores.** Fine ore is intimately contacted with soft coal dust containing a bitumen. The mixture is whirled in a carbon monoxide-containing reducing gase at 350-540 deg. C. Part or all of the ore may be admixed with the coal and pelletized into small pellets. K. von Haken, one-half assigned to Erzredukt G.m.b.H. May 16, 1961. Canadian 620,151.

**In the crushing and grinding of ores,** such as taconite, Canadian and New York high-lime iron ores, etc., the ore is conveyed to a substantial height and dropped onto a thick bed of smaller pieces of the ore. Oversize is screened off and again dropped. J. F. Meissner. May 23, 1961. Canadian 620,527.

**Copies of Canadian patents can be obtained by writing to Commissioner of Patents, Patent & Copyright Office, No. 8 Bldg., Carling Ave., Ottawa.**

**Pyrometallurgical method for processing complex granitic pegmatites** to recover beryllium, lithium, columbium, tantalum, and other metal values present. A. M. Thomsen. May 23, 1961. Canadian 620,-534.

**In an iron ore pelletizing drum, material adhering to the wall is scraped to form helical grooves.** The non-adherent ore is balled inside groove scrapings, thereby producing compact balls of desired diameters. I. H. Wynne, assigned to Oglebay Norton Co. May 23, 1961. Canadian 620,553.

**Improved pneumatic apparatus for concentrating mineral values** from alluvial or crushed ores, such as ores of gold, tungsten and mica. The material is separated on the basis of specific gravity by the combined action of cyclonic and straight air flow. F. H. Clute, assigned to Clute Corp., May 2, 1961. Canadian 619,363.

**Separation of columbium minerals, such as pyrochlore and niocalite,** from their common gangue associates. The pulverized ore is pulped, and the pulp conditioned with the usual reagents plus a small amount of catchol or pyrocatechol, and subjected to froth flotation to concentrate the pyrochlore and niocalite in the froth product. C. H. G. Bushell and H. E. Jackson, assigned to Nova Beaucage Mines Ltd. May 9, 1961. Canadian 620,041.

Mr. North is patent consultant, Washington, D.C.

# NEW BOOKS

*Keeping up with your profession*

**Mine Ventilation and Air Conditioning,** by Howard L. Hartman, head, department of mining, The Pennsylvania State University. This long-awaited, muchneeded, fundamental text offers a modern and comprehensive treatment of mine ventilation. Quality control, quantity control, and temperature-humidity control are main divisions of the book. From the preface: "Considerable attention is directed to the part economics plays in design and operation; equations are derived to allow the total cost of a design to be determined, actual working plants are studied from design through operation, the various instruments and equipment available are described along with the circumstances that dictate their choice. Tables demonstrating the relative merits of the various types of equipment are provided. The federal and state laws that affect design are listed and their effects on design are discussed. With the inclusion of operating and maintenance principles, this book offers a full coverage of mine air-conditioning practice." Published by The Ronald Press Co. 15 E. 26th St., New York 10, N. Y. 398 pp. Price $12.00.

**E&MJ Monitor**

**Drilling and Blasting Symposium,** Quarterly of the Colorado School of Mines, Vol. 56, No. 1, January 1961. Contains 17 reports from leading specialists on recent developments in drills and explosives. Performance and cost analysis are given as well as proposals for new techniques—such as the theory and practice of inclined drilling. Discussions following the sessions are included as well as a summary by John J. Reed and John S. Rinehart. Jointly sponsored by the Colorado School of Mines, University of Minnesota and Pennsylvania State University, the Quarterly is available from the Colorado School of Mines, Golden, Colo. 338 pp plus illus. Price $4.00.

**World's Non-Ferrous Smelters and Refineries, 1960,** sixth edition, edited by Harry G. Cordero, foreign editor, METAL BULLETIN. Contains detailed, up-to-date statistics of companies owning or operating smelters and refineries, indexed by country. Company statistics include year established, offices, directors, capital, properties and plant, products, sales offices, and subsidiary companies. Also included is a directory of non-ferrous metals and alloys producers indexed by metal. Published by Quin Press Ltd., Birdett House, 27 Albemarle St., London, W.1. 451 pp.

**Kempe's Engineers Year Book 1961.** This two-volume set of books, issued yearly, is an up-to-date reference covering all phases of engineering. Sections of particular interest to the mining men are mining engineering; explosives; air compression, pneumatic equipment, etc.; motor vehicles; gas turbines; railway engineering; wire ropes; grinding, abrasives and polishing appliances; mechanical handling; and belts, ropes, and clutches. Because of its extensive coverage, the set provides a handy reference for engineers with design problems outside their particular fields. Published by Morgan Brothers (Publishers) Ltd., 38 Essex St., Strand, London, W.C.2. 2732 pp. Price (two volumes in case) 87/6d. (plus postage).

**The Fourth Symposium on Rock Mechanics,** Bulletin 76. This book includes 27 papers covering the following: Strata movement from underground openings, behavior of rock under static and dynamic loading, stress measurement and ground control, and dynamic loading in rock penetration. Particularly significant is the progress made towards developing a valid theory of rock behavior and failure under static loading. Although more controversial, some insights into dynamic rock properties also emerge. Mechanics of subsidence become understandable and workable, probably for the first time, to American readers, and some order seems to emerge from the wide array of underground instrumentation techniques being developed. Application of basic principles of rock failure to drilling and blasting are also advanced. Published by the Mineral Industries Experiment Station, Pennsylvania State University, University Park, Penn. 175 pp. Price $5.00.

**Mines in the Spinifex, The Story of Mount Isa Mines,** by Geoffrey Blainey. This highly readable, historical book deals mainly with the people responsible for the development of Mt. Isa, including the various English, Russian and American financiers, from the discovery in 1867 to the present. Published by Angus & Robertson Pty. Ltd., 221 George St., Sydney, Australia. 242 pp. plus illustrations. Price 27s. 6d. (Australian).

**Mining Year Book 1961,** compiled by Walter E. Skinner. The 1961 edition contains complete and up-to-date particulars of 1000 of the principal mining companies of the world. Gold and base metals production are tabulated for the past three years. Also included is an international buyers guide. Typical divisions by company include officers, offices, mines and works, property description, production, ore reserves, capital, dividends and accounts. Published by Walter E. Skinner, 20 Copthall Ave. London, E.C.2., and Financial Times, 10 Cannon St., Condon, E.C.4, England. 795 pp. Price $7.00 (post free).

**American Law of Mining,** edited by The Rocky Mountain Mineral Law Foundation. Thirty-seven mining law specialists have contributed to this five-volume work, which is the first definitive treatise on the subject. Contents are divided as follows: (1) Sources and evolution of American mining law, (2) mineral development of federal public domain, acquired and reserved lands, (3) development of federally reserved minerals in fee lands, and (4) prospecting and discovery. Thoroughly definitive, yet practical, the books also contain a large collection of forms used by experienced law firms in dealing with specific problems and procedures in mining. Published by Matthew Bender & Co. Inc., Albany 1, N.Y. 5 looseleaf binder volumes, easily supplemented. Price $150.00

**The Design of Small Direct-Current Motors,** by A. F. Puchstein. Emphasis throughout the book is on the electromagnetic aspects of design problems and orderly procedure. Suitable as a reference or text, the book provides in sequential order alternate design methods, depending upon the material available. Published by John Wiley & Sons Inc., 400 Park Ave. South, New York 16, N.Y. 407 pp. Price $12.00.

**BOOKS presented on this page may be obtained directly from the publisher mentioned in each case. E&MJ does not sell books.**

**Proceedings of Symposium, Surface Mining Practice,** edited by Harry E. Krumlauf. This paper-bound booklet contains copies of 16 papers presented at the Tucson symposium, Oct. 17-19, 1960. Subjects of sessions were (1) nonmetallic mining practices, (2) southwestern surface mining practices, (3) computer and system analysis, and (4) miscellaneous surface mining subjects. Published by the College of Mines, The University of Arizona, Tucson, Ariz. 124 pp.

**Compressed Air and Gas Handbook,** third edition. The best single source of air and gas information for engineers, the book contains a wealth of tabulated data. Also included are sections on air economy, maintenance schedules, lubrication, etc. One complete chapter is devoted to air-operated rock drills and associated equipment. Developed, edited and printed by Editing and Publishing Board, Compressed Air and Gas Institute, 55 Public Square, Cleveland 13, Ohio. 592p, 323 illustrations. Price $8.00.

**Geology of the White Pine Mining District, White Pine County, Nevada,** Bulletin 57, by Fred L. Humphrey. Available from the Nevada Bureau of Mines, University of Nevada, Reno, Nev. 119 pp plus maps. Price $3.50 plus 15¢ for postage and handling.

*(Continued on p 98)*

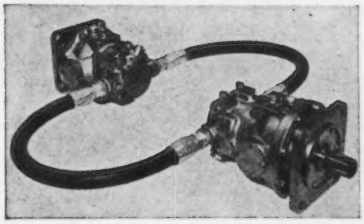
# NEW EQUIPMENT

*Tomorrow's tools and methods*

## Hydrostatic Transmission Reduces Parts and Is Easy to Operate (30)

NEW HYDROSTATIC transmission, where the conventional drive shaft, universals, gear changers and clutches are replaced by high-pressure hoses, has been developed by the New York Air Brake Co.'s Watertown Div.

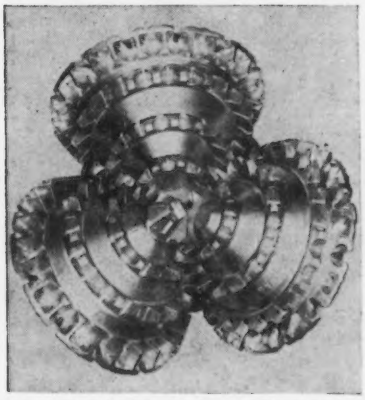
In its simplest form, Watertown said, the DYNAPOWER transmission consists of a variable displacement axial piston hydraulic pump which is coupled directly to the vehicle's engine and a fixed displacement hydraulic motor which drives directly into the differential. The hydraulic motor's speed and direction of rotation are determined by the position of the pump's variable cam.



In addition to eliminating the wear-prone drive line components (clutches, universals, driveshafts, and gear changers) DYNAPOWER has the following advantages:

1. Full torque at low engine speeds—even idle—which eliminates the tendency for the vehicle to run away with itself when the peak torque requirement abruptly disappears.
2. Infinitely variable, stepless, speed ratios.
3. Reduced brake maintenance—transmission itself can handle all service braking requirements.
4. Easy to operate, since a single control determines both direction and speed.
5. Faster, yet smoother response to direction changes.
6. Increased vehicle utilization range.

For the past two years, thousands of hours have been accumulated by DYNAPOWER on lift trucks, front-end loaders, crawlers, and similar type materials-handling and off-highway vehicles.



### Improved Three-Cone Bit (9)

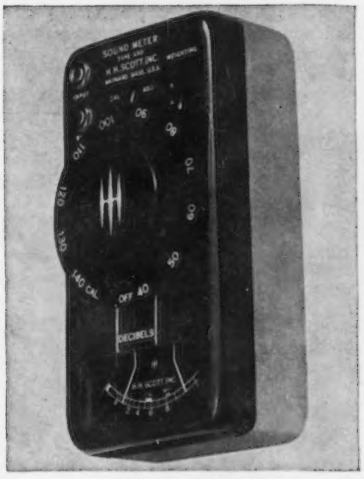
IMPROVED three-cone bit design for blast hole drilling permits larger bearings which will allow increased weights to drill harder sections, according to Varel Mfg. Co.

The tool, the VQM three-cone rotary rock bit in 8¾-in. and 9-in. sizes, regular or jet, for air or fluid drilling, has somewhat square teeth instead of rectangular chisel shaped teeth. Varel said that this gives more cross-sectional area at the end of the tool from the time the bit is new until it is completely worn out. It will, therefore, give more total footage without sacrificing penetration rate.

### 15 Euclids to Turkey

THE LARGEST single shipment of earth-moving equipment to be loaded at Cleveland recently sailed up the St. Lawrence Seaway as GM's Euclid Div. exported 15 rear dump haulers to Iskenderun, Turkey. All of the machines, totaling 285 tons, will haul copper ore and overburden at Turkey's Ergani development.

An even larger shipment of Euclid equipment is expected to be made in the near future.




### Compact Noise Meter (12)

NEW TRANSISTORIZED SOUND METER which can measure noise levels in any location, and which has an exceptionally wide range of operation, is available from H. H. Scott, Inc.

Scott's 450 meter weighs only two lb, is run by a 22.5-v battery with an operating life of 30 hr, and has a sound level range of from 35 to 142 db.

The 450 has a direct reading scale to minimize errors and its amplifier is stabilized against voltage and temperature changes. Scott said the instrument costs $150 and has a one-year parts-and-labor guarantee.

### Protective Skin Powder (8)

ONOX, INC has announced that their skin-toughening solution for the treatment and prevention of athlete's foot is now available in 6-oz spray bottles. The company said that they will be able to dispense the squeeze bottles to worker, and to office personnel for uninterrupted daily application in plant and at home.

### Four-Wheel Steering and Drive (5)

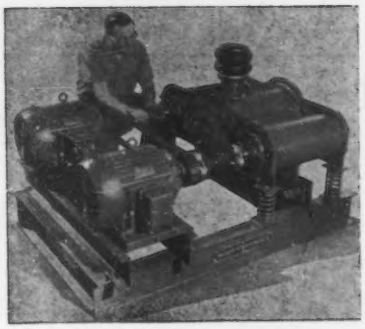
NEW LINE of four-wheel drive, four-wheel steer tractors is being introduced by M-R-S Mfg. Co. The two models in the line — the 123-hp I-190 and the 175-hp I-100 — have torque converter-powershift transmission as standard equipment or an optional ten-speed constant mesh transmission.

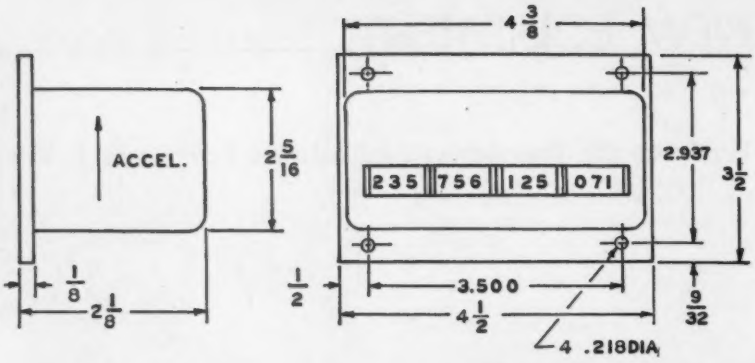
The machines' independently controlled hydraulic steering permits the operator to use coordinated, "crab," independent front wheel and independent rear wheel steering.

M-R-S said that the four-wheel drive units operate efficiently with hydraulic bulldozers and hydraulic scrapers or with mounted attachments such as hydraulic cranes, buckets loaders, backhoes, tool bars and logging equipment.

### Indian Manufacturing Combine

MCNALLY PITTSBURG MFG. CORP. and Bird & Co. Ltd. of Calcutta have joined forces and established an Indian corporation which will manufacture heavy equipment to be used in India's basic industries. The new firm, McNally-Bird Engineering Co. (Pvt.) Ltd., will make material handling equipment, material processing equipment, crushers, screens, speed reducers, belt conveyors, dryers, calcining equipment, coal washing equipment, and many other items.






### Redesigned Vibrating Mill (4)

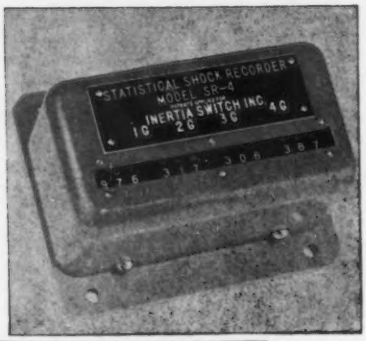
ALLIS-CHALMERS has redesigned its synchronized dual drive vibrating grinding mill for easier maintenance. The vibrating mechanism has been shifted from the grinding chamber's interior and put next to the chamber — no longer any need for bearings within the chamber. In addition, A-C reported, since the mill's vibrating mechanism is now completely enclosed, it no longer needs a circulating lubrication system.

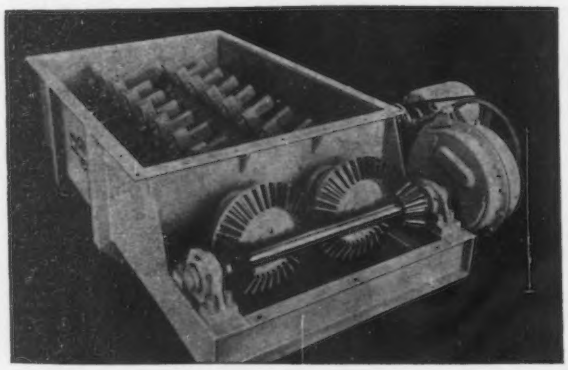
The company said that though the initial cost of a vibrating mill is at least one-third lower than a tumbling mill, it is capable of out-producing it by 15 to 30 times per unit volume.

### Shock Recorder (50)

A STATISTICAL SHOCK RECORDER which makes it possible for any manufacturer to monitor his shipments for damage in transit, and which can be used on mine railroad systems to detect the shock on cars during normal runs or at loading and unloading, is being introduced by Inertia Switch Inc.

According to Inertia, the unit is unidirectional and each of its four channels can be set anywhere from less than one to 25 G. Its accuracy is ±5% and it operates from minus 65°F to plus 250°F.

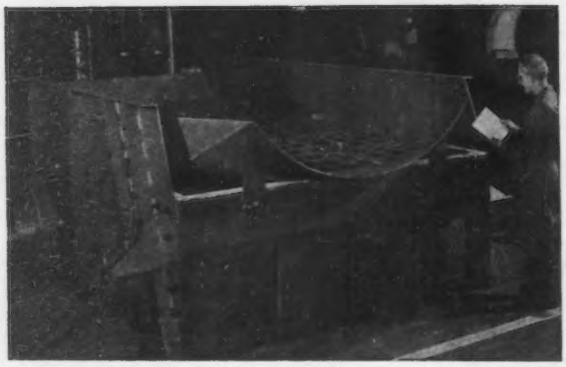


### Improved Clay Breaker (1)

MCLANAHAN CORP. is introducing the Clay Breaker, a machine designed for continuous chopping of clay and ore feed in processing systems. It fits under the feed hopper, continuously accepts material, and then cleaves it between a series of meshing paddles on each of two paddle shafts. The paddle action further keeps the feed agitated to provide a uniform flow of broken material from the machine to the conveyor.

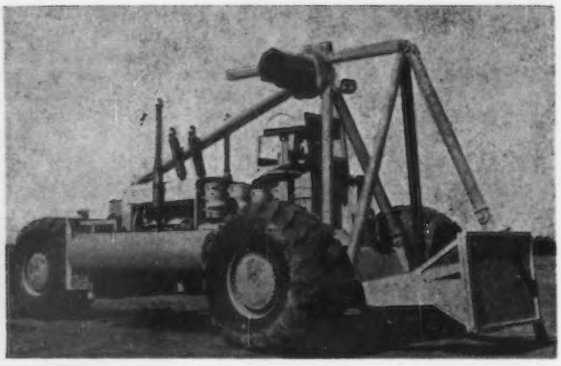
McLanahan's unit is completely self-contained, with box and drive mechanism and motor permanently mounted on a structural steel base. Power comes from a 7½-hp motor, and a hydraulically-protected sheave safeguards drive machinery against shock loads.



### Space-Saving Screen (3)

ALLIS-CHALMERS' single-deck Ripl-Flo scalping screen saves space by having a curved discharge end section which feeds oversize directly into a crusher or breaker.

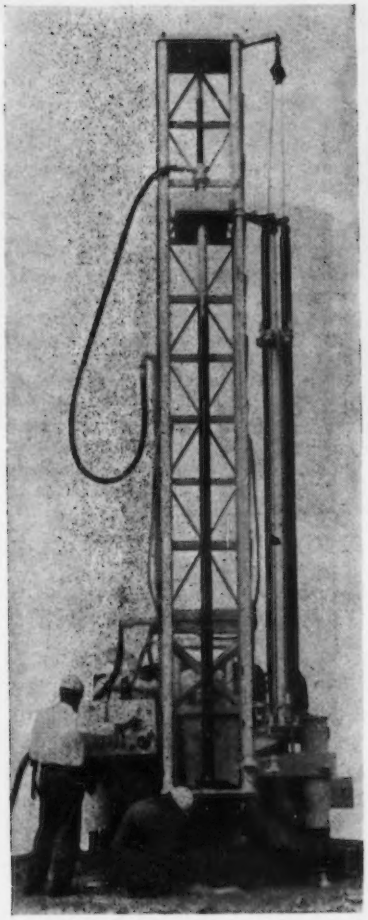
Ripl-Flo handles stone, ore and coal. The unit in the photo is an 8 x 14-ft floor-mounted, rubber air-spring supported screen which is now processing 1300 tph of run of mine coal.



### Huge Scraper Pusher (2)

HUGE 840-HP RUBBER-WHEELED tractor, which is intended to supplant tandem pushers for loading big-capacity scrapers, is now being marketed by R. G. LeTourneau, Inc.

The diesel-electric monster, a Series K-103 "Pacemaker" tractor, is 42 ft long, 15 ft wide and 16 ft high. Its three wheels develop over 90,000 lb drawbar pull.

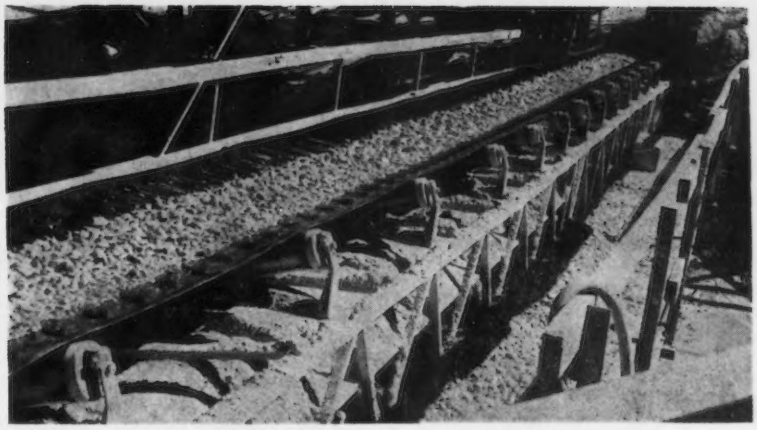


## Heavy-Duty Rotary Drills (10)

MOBILE DRILLING, INC.'S new Stroke-master Series of extra-heavy duty rotary drills permits a choice of either 12, 17 or 22-in. stroke for greater flexibility in the selection of drilling tools and procedures. The company said all three models take rotary or down-hole tools to 500 ft in rock and NX cores from 2000 ft; auger 24 in. holes to 100 ft and perform any standard sampling or testing procedure. Applications range from air blast hole drilling and shot hole drilling, to grouting, prospecting, caisson boring and soils testing.

Construction features of the new units include heavy-duty power train with dual-range torque converted and four-speed industrial transmission driving 3-in. sq, hardened steel kelly. The 4-in. tubular steel mast has 25,000 lb single line pull rating.

**E&MJ Monitor**



## Ribbed Conveyor Belt Handles Wet Material (13)

RIBBED CONVEYOR BELT for handling wet or slippery materials up inclines has been developed by Manhattan Rubber Div., Raybestos-Manhattan, Inc. The belt's ribs form pockets that prevent wet material from running back, and, if water drainage is desired, the belt can be reversed.

At one installation, Servtex Materials Co., New Braunfels, Texas, the belt handles a soupy sand or gravel and water mixture.

## Improved Vibrating Feeder (57)

STEPHENS-ADAMSON MFG. Co. has developed a new vibrating feeder which they say is the first to be equipped with a solid drive, variable eccentric connecting rod which controls amplitude of stroke and insures constant flow of material at any setting regardless of varying headload.

The new "Solid Stroke" feeder has an infinitely variable feed rate, from zero to maximum, and this rate can be varied while the feeder is in operation.

According to the company, the new feeder is the only vibrating unit that takes full advantage of the principle of natural frequency to aid the conveying action. Once put into motion by the electric drive motor, coil springs vibrate the conveying trough at a predetermined natural frequency. Thus, power is regenerated in the springs to start the next stroke, and little additional power is required to keep the trough operating.

Material is moved by a throwing rather than a sliding action, reducing trough wear. Troughs can be made of stainless steel or any other material and are easily cleaned. They can be positioned either above or below the operating unit—only a minimum space and headroom are needed.

The variable stroke action can be controlled with simplified, finger-tip controls, and the stroke setting is recorded automatically on a meter.

## Swivel Air Gage (58)

New swivel chuck air gage designed to service all large bore tire valves at angles from 90° to straight on, has just been developed by the Dill Mfg. Co.

A turn of the simple swivel chuck lets valves be checked from any position, simplifying service of "hidden" valves or valves behind steel protective shields.

The gage is calibrated in two-lb increments from 20 to 130 psi.

## Small Steel Gate Valve (59)

An inside-screw small steel gate valve, newly designed and made for fast installation in a limited space, is being introduced by the Lunkenheimer Co.

The valve has screwed or socket ends, available in a bolted bonnet design in 1½ and 2-in sizes, and in a union bonnet in sizes ¼ in. through 1 in. An inside-screw rising stem, solid-wedge disk, and rolled-in seat rings are features of the valve.

The new valves are rated 800-lb—850°F and 2000 lb—100°F. and will be companions to the line of 800 lb forged steel gate valve, Figures 8001-2, with outside-screw rising stem.

## Two-Stage Oil Filter (60)

New OFM Series oil filters with capacities up to 300 gpm are now available from Vickers Inc., Div. of Sperry Rand Corp. They are designed for two-stage filtration to trap and retain foreign particles over 8 to 10 microns in size.

The two-stage advantage, Vickers said, is achieved by using two layers of Alpha Cellulose. The outside layer is untreated and offers a pure absorbent surface with a high affinity for dirt, moisture and acid. It filters out contaminants before the oil passes through the impregnated second layer for fine straining.

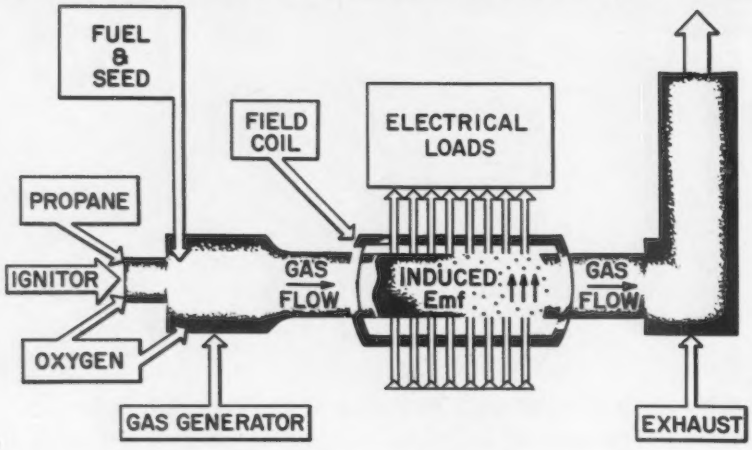
## New Shaft Seals (61)

New line of "unitized" shaft seals in the low to medium price range has been introduced by Gits Bros. Mfg. Co.

The line's three seals all contain both stationary seal face and positive-drive mating ring assembled as one unit.

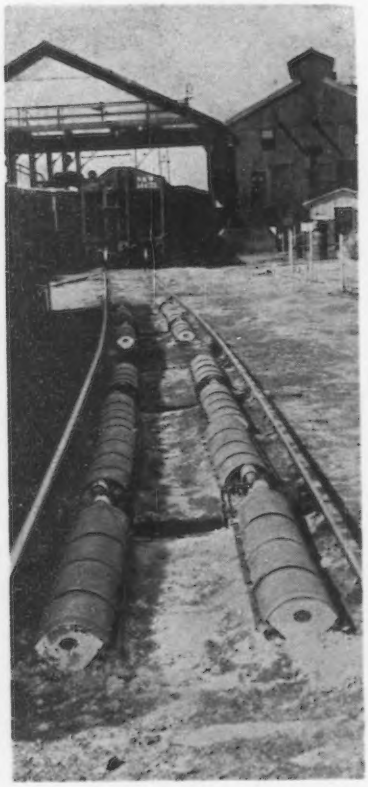
The seals may also be disassembled and the seal faces reconditioned, resulting in longer seal life and ease of service in the field.

## Experimental Power Generator May Have 60% Conversion Efficiency (31)




AN EXPERIMENTAL power generator, the new magnetohydrodynamic (MHD) system developed by the Avco-Everett Research Laboratory, uses 22 tons of copper plates which are connected to form a coil —all supplied by Revere Copper & Brass Inc.

When perfected, Revere said, the system is expected to provide an important new source of electrical power. Twelve utility companies have joined the Avco-Everett Research laboratory in underwriting studies to develop the new system which has an anticipated conversion efficienty of 60%, compared to the 35-40% conversion efficiency of conventional generators.

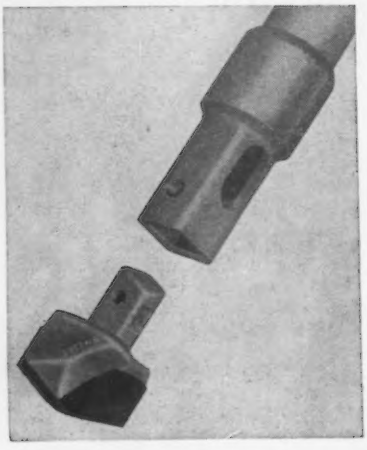


### Improved Undercar Thawers (6)

NEW TYPE of gas-fired undercar heaters which give radiant and convection heat simultaneously, and which, at one installation, have cut hopper car thawing time by as much as 75%, have been designed and built by Hauck Mfg. Co.

Hauck said that the improved thawers can be operated by the existing thawing crews — no additional manpower required. The company also said costs have been reduced, because demurrage and car damage, always a danger with certain other car-thawing schemes, have been eliminated.

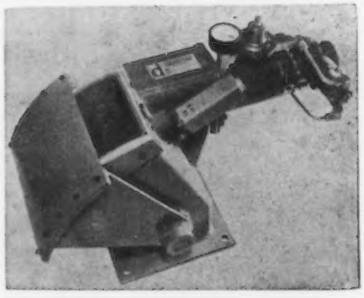
## E&MJ Monitor



### Roof Bit-Steel Combination (7)

NEW ROOF BIT and drill steel combination, an FVH, designed for maximum dust removal without loss of drilling speed, has been developed by Kennametal Inc.

The combination has heat-treated prefabricated chucks and shanks, giving strong metallurgical properties to the components, which otherwise would not be possible. An integral collar on the ½-in. sq chuck traps the dust in the slotted section above it, through which the dust is drawn into the hollow drill steel. Kennametal added that another design improvement locates the pin holes at right angles to the dust removal slots so that the pin that holds the bit cannot obstruct the flow of dust or cuttings.



### Swing Gate Feeder (11)

NEW SWING-GATE FEEDER for free-flowing materials that controls flow into automatic weighing systems or continuous process streams has been developed by Dynametrics Corp.

The feeder is available with either two-position full on-off control, or with modulated feed control to obtain full-flow to cut-off with modulated response. It is self-cleaning and can be ordered in a wide range of flow rates.

### Mine Fire Fighter (55)

SEVERAL TYPES OF underground fires which in the past were almost impossible to combat, may now be brought under control by a portable foam producer from Mine Safety Appliances Co.

The unit, called M-S-A "Foamaker", is capable of delivering a quenching wave of foam one minute after the equipment has reached the scene and can direct high-expansion foam into a dead-end mine entry from distances up to 250 ft.

The fire fighter consists of an axial vane fan mounted on a rubber-tired truck, a foam-mixing chamber, and 24-in. plastic tubing in lengths up to 250 ft. During operation, the fan is first turned on to unroll the tubing in the direction of the fire. Then, full-cone spray nozzles play ten gal of water per minute mixed with the foam agent onto a specially-designed screen. The fan forces the foam at a maximum rate of 5000 gpm through the plastic tubing and onto the fire area.

# OPERATING BULLETINS

*Free aids to better planning*

**COMMON** conversions such as in. to centimeters or watts to hp, as well as many conversions that are difficult to locate in reference manuals, now appear on a handy wall chart published by Precision Equipment Co. **(72)**

**UNIVERSAL METAL HOSE CO.** has just published a new bulletin—No. IPB-Sec. 3A (a)—which covers a wide selection of flexible metal hose specially designed for gravity or pneumatic transfer of grains and bulk materials where resistance to severe abrasion and corrosion are required.

Some of the hoses discussed by Universal include: "Steelflex" Type U-100 low cost standard weight (electro galvanized carbon steel); Type U-120 in light heavyweight, medium heavyweight, extra heavyweight and superweight (hot dipped galvanized carbon steel); and "Easyflo" in standard and heavyweight—with special galvanized carbon steel or stainless steel liner. **(73)**

**HOW** To Use Manganese Rods and Weldments, a new 16-page booklet from American Manganese Div., American Brake Shoe Co., offers instructions and welding tips useful in the repair and rebuilding of worn parts. **(74)**

**DORR-OLIVER'S** new bulletin No. 3002 describes its complete line of thickeners for chemical, metallurgical and industrial processing.

The brochure describes and lists standard sizes and specifications for the Modern Thickener designs and mechanisms and also covers single and multiple compartment thickeners having both center-drive and perimeter-drive rakes in a variety of configurations for unit operations in all the process industries. **(75)**

**KELLY MFG. CO.** has published a four-page leaflet describing its all-steel jeep cab which is built to support a top load of four times the rated capacity of the vehicle.

Some of the cab features, according to Kelly, are: all-welded construction; girder-type interior roof supports; 45° roof angle for greater rigidity; and interlocking reinforced rear corner supports. **(76)**

**ANOTHER** four-page Kelly presentation tells of the quality control, methods of production and storage facilities for its mining machine parts. **(77)**

**THE MIKRO-PULSAIRE** collector designed to recover noxious and high-value dusts and which is the only unit of its type with no moving parts—internally or in the primary gas stream—is described in a fact-filled 10-page bulletin (52A-2) from Pulverizing Machinery Co. **(78)**

**FEATURES** of the Allis-Chalmers 20-35 KW electric set are outlined in a new two-color fold-out from the company's Engine-Material Handling Div. The bulletin also describes the G-226 gasoline engine that powers the set and explains the unit's brushless generator.

The set's important components are illustrated and specifications are included. **(79)**

**DU PONT'S** new bulletin D-115 outlines the properties of industrial fire hose jacketed 100% with Dacron. The company subjected the Dacron hose to a series of tests, and the results of these are presented in the brochure. Hose properties that are discussed include: strength, comparative weights, water absorption, abrasion resistance, microorganism and insect resistance, and resistance to chemicals. **(81)**

**COMPLETE SELECTION** data and engineering specifications of the cushioned, automatic relief-unloading valve are included in Golden-Anderson Valve Specialty Co.'s new four-page bulletin, S-5. The valve is designed for steam, air, gas, and fluid control services. **(82)**

**THE BASIC** applications possible with self-sealing couplings are discussed in a well-prepared 20-page booklet from Aeroquip Corp. The booklet is basic—Aeroquip begins by saying that a self-sealing coupling is a connection that seals off both halves when disconnected and that it may be used on fluid lines for service or changing accessories, permitting quick disconnection without loss of fluid or pressure. Then, with an abundance of clear sketches, the company outlines the following applications: for testing a machine or hydraulic system; as a junction or bulkhead connection; as a two-way shutoff valve; as a safety measure to prevent human error; for draining a fluid system; and as a fueling connection. **(83)**

**AMERICAN SEALANTS CO.'S** liquid resin, Loctite, keeps high-speed machines from being shaken apart by their own vibration. According to the company, more than a dozen makers of high-vibration appliances, chainsaws, and construction machines, not only use Loctite, but also distribute it through their own service channels, and that thousands of other companies use the liquid for locking manufactured parts and for plant maintenance. American Sealants describes its resin in an illustrated eight-page bulletin. **(84)**

**NEW DESIGNS** in rubber seat butterfly valves appear in a bulletin (6) from the Henry Pratt Co. The presentation covers models from 3 to 144 in. and for pressures from vacuum to 150 psi. **(85)**

**POWER INCREASE** in the new 125 rotary compressor (53-hp machine that provides a 60% power surplus to the compressor at only 1600 rpm) is described in a new bulletin from Le Roi Div., Westinghouse Air Brake Co.

The four-page presentation discusses automatic switches to control air and engine oil temperature as well as design features to reduce maintenance and repair. **(86)**

**U.S. STEEL CORP.** has bound four papers which discuss continuing advances in the strength levels, product forms and design applications of constructional steels into a 59-page brochure entitled, "New Concepts in Steel Design and Engineering."

The pamphlet's illustrations and descriptions of many actual designs and design concepts show how these steels can be used in structures and


**E&MJ** NOT GOOD AFTER FEBRUARY 1, 1962 **AUGUST 1961**

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# OPERATING BULLETINS (Continued)

equipment to achieve higher strength, lighter weight and lower costs. **(87)**

**NORDBERG MFG. CO.'S** new six-page bulletin, "Just Mix and Pour," describes the non-metallic backing agent now widely used in gyratory crushers, grinding mills and other machinery. The fluid, called Nordback, can quickly and safely back crusher members on-the-job.

Part of Nordberg's fold-out release explains order requirements for export shipping and also contains a chart that lists quantity requirements for both standard and short head cone crushers. **(88)**

**VARIOUS WAYS** to cut down on costly conveyor belt wear are shown in cartoons on a wall chart from Hewitt-Robins. The chart outlines procedures for storage, record keeping, alignment, impact idlers, drive pulley lag, loading chute, skirting rubber, automatic switches, inspection schedules, lubrication, fasteners, and repair. **(89)**

**OPW-JORDAN'S** catalog, TCV-1, contains complete engineering information and technical data on the company's line of temperature regulators. It contains cutaway pictures, names of parts, ratings, dimensions, applications, ranges, materials of construction, sample specifications, flow curve and sizing charts. **(90)**

**ANOTHER** Jordan catalog, NP-800E, describes an automatic tire inflator for autos and trucks, and which can also be used to fill any device to a preset pressure and shut-off automatically. The inflator is accurate to one lb and has a fine mesh screen to filter out foreign matter. **(91)**

**LINK-BELT CO.'s** new line of Series P2-300 self-aligning ball bearing pillow blocks in 31 shaft diameters is described in a new four-page folder (2951).

The new series is available in a complete range of shaft sizes from 5/8 to 4 in., and the bulletin contains a full-page chart that shows interchangeability dimensions. **(92)**

**MINE SAFETY APPLIANCES CO.** has published a new bulletin that describes a simple, effective collector which draws dust through hollow drill steel during placement of holes for roof bolts in underground mechanical operations.

Called the M-S-A Thru-Steel dust collector, the unit is approved by the USBM and can legally be added to any approved drill or used to convert existing systems.

The collector draws dust into a slot below the bit as it penetrates the roof, and, from the slot, dust is routed through the drill steel, chuck adapter and flexible hose by pump generated vacuum into a tank where the filter retains dust and expels clean air through a muffler to the atmosphere. **(93)**

**LATEST** techniques and equipment for air pollution control are presented in a new 12-page, illustrated brochure published by Research-Cottrell, Inc. **(94)**

**SIX MODELS** in Athey Products Corp.'s new line of T-Line trailers are described in a fold-out brochure.

Athey's bulletin gives details of the new trailer developments—extra capacity, the T-1 steel construction, and the use of Caterpillar diesel power for faster haul speeds and increased usable power. **(95)**

**NEW BULLETIN** which describes all the equipment necessary to run sieve analyses has been published by TESTlab Corp. The following tools are described in the four-page presentation: sieve shaker, both manual and motorized; U.S. Standard sieves, 8- to 12-in. dia; portable sieve sets; sample splitters and quartering canvas; and 15 different scales, specially selected for gradation work. **(96)**

**EASY-TO-FOLLOW** chain drive selection procedures for the Rex stock industrial chain lines are contained in a new bulletin from Chain Belt Co.

Data in the 12-page bulletin's seven selection tables are arranged to quickly pick chain sizes, sprocket sizes, center distances, chain lengths, and the ranges of A.S.A. roller chain stock sprockets and Chabelco sprockets. **(97)**

**TWO NEW** types of fire brick, recommended for both direct exposure and back-up insulating purposes, are described in Johns-Manville's new four-page brochure, IN-294A.

Some of the advantages of the new brick, called JM-23 and JM-20, are: low iron content; low thermal conductivity; high load bearing strength; light weight; and ease of field cutting. JM-23 is recommended for service to 2300°F and JM-20 to 2000°F. **(98)**

## E&MJ Monitor

**EIMCO'S** new bulletin L-1078 outlines through pictures, graphs, cartoons and sketches just what is torque and how a torque converter works, and the advantages of a single-stage torque converter versus a multi-stage design.

The 24-page booklet compares Eimco's "unidrive" powershift transmission engineered for a single stage torque converter with the conventional gearshift drive and then outlines: fuel consumption and economy figures and comparisons; cost and operating advantages; and the closed circuit Eimco hydraulic system versus fuel oil hydraulic systems. **(99)**

**A FOLDER** containing specification sheets describing aluminum truck bodies and how they can reduce both weight and operating costs has been prepared by Ravens-Metal Products, Inc.

One sheet, Case Studies in High-Payload Profits, shows how the aluminum bodies can add as much as $1188 extra monthly profits (this case based on three trips daily at $3 per ton when a steel widespread was replaced by a Ravens aluminum tri-axle and had an extra 6-ton payload).

The other sheets describe Ravens all-aluminum dump bodies, tandems, tri-axle, and flat bed. **(100)**

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**New Products**
**Engineering & Mining Journal**
**330 W. 42nd Street**
**New York 36, N.Y.**

Hooking up the holes proceeds without danger of premature detonation from stray electric currents.

Delay connectors are attached to Primacord downlines; LEDC trunklines are cut and crimped into these connectors.

The dual connections are taped securely together and the ends of the Primacord downlines are tied.

# ENSIGN-BICKFORD LEDC helps solve blasting noise problems at General Crushed Stone Quarry

The Glen Mills Quarry of the General Crushed Stone Company at Glen Mills, Pa., is located in the heart of a residential area. *And its neighbors don't like noise!*

The quarry produces aggregate from hard granite gneiss, very blocky and seamy. High explosives are used with Primacord® downlines for in-hole initiation. These downlines are hooked into a surface system of LEDC trunklines and Delay Connectors.

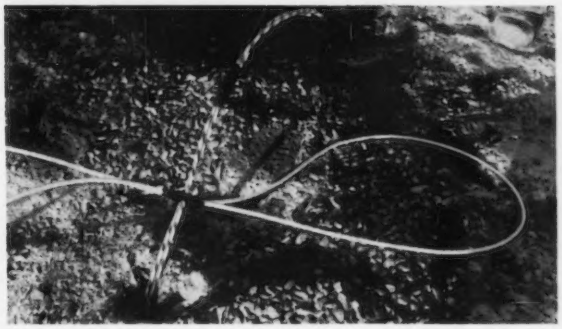
### Danger of Prematures Minimized

Blasts are set off at a specified time each day. This means that loaded holes may stand for several hours before blast time. To minimize danger from stray electric currents, the electric blasting caps are never attached until the last minute.

The use of trunklines of Ensign-Bickford Low Energy Detonating Cord has practically eliminated the noise problem—and without danger of premature shots from stray currents.

This blast was set off on December 6, 1960. It consisted of eight 7-in., 50-ft. holes at 15-ft. intervals in a line 20 feet back of the base of a 46-ft. face. Loading was under the direction of Harry Kemery, Superintendent, and Morton McGuirk, General Quarry Foreman. High explosives were used with two primers in each hole, initiated by Plastic Wire Countered Primacord downlines.

A continuous line of LEDC was laid from Hole No. 8 to Hole No. 1 and back again, forming two trunklines. Delay Connectors were attached to each downline, and the trunklines were cut and crimped into the Connectors, which were then taped securely together.



Two Electric Blasting Caps were taped onto the Primacord downlines at No. 1 Hole, which fired instantaneously. Succeeding holes were progressively delayed 15 milliseconds.

*Noise was no problem!* . . . just the normal thud of explosives breaking rock.

Ensign-Bickford LEDC is a Low Energy Detonating Cord with two grains PETN per foot, encased in a lead tube and protected by a plastic jacket. It detonates throughout its entire length at nearly four miles per second, but detonation noise is *low*. 150 feet of LEDC makes no more noise than a single blasting cap!

LEDC will not directly initiate Primacord or other cap-sensitive explosives. It is used with connectors developed by E. I. du Pont de Nemours & Co., Inc. LEDC is made only by Ensign-Bickford. Both are available through all explosives manufacturers.

If you have blasting noise problems, LEDC may be the answer. Write for free bulletin; also a free copy of the new Primacord catalog and manual is available through your explosives manufacturer—or write giving your company name.

**THE ENSIGN-BICKFORD COMPANY**

Simsbury, Connecticut • Since 1836

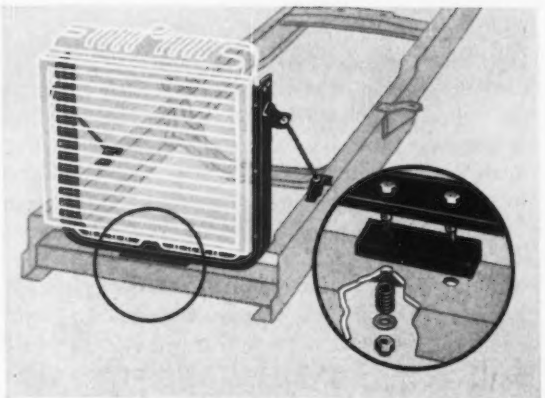
E-B

# FORD HEAVY DUTY CONSTRUCTION

Ford's 1961 Heavy Duties are especially designed and built to stand up under the severe strains of off-road work. Heavier gauge steel, sturdier reinforcements and new independent mounting systems to separate radiator, fenders and cab are utilized on all heavy-duty conventional trucks, F-800 Series and up (plus all T-Series Tandems). This stronger construction with each component *individually* frame-supported doubles radiator and sheet metal life—cuts down-time and maintenance expense.

**Heavier gauge metal in radiator tanks and headers** resists vibration, jolts and corrosion for greater reliability. Ford's "lock-seam" radiator construction doubles the solder area at key seams for greatly increased strength and longer radiator life.

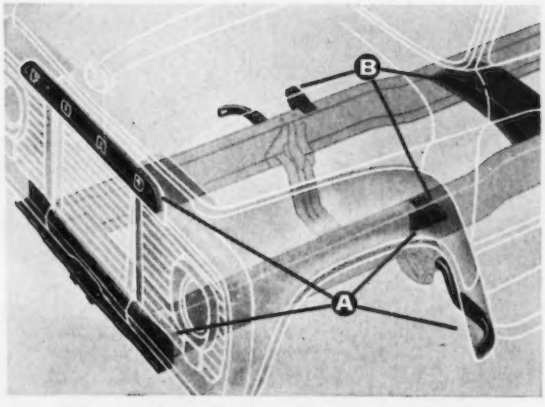
**Special "horse collar" mounting of radiator** (shown at right) separates it from front-end sheet metal. Resilient rubber mounting on frame cross member, shown in insert, soaks up road shocks . . . cuts wear and tear on entire cooling system. Diagonal braces at each side are attached to frame for added support.



QUALITY-BUILT...

# FORD TRUCKS

# DOUBLES RADIATOR, FENDER AND CAB LIFE



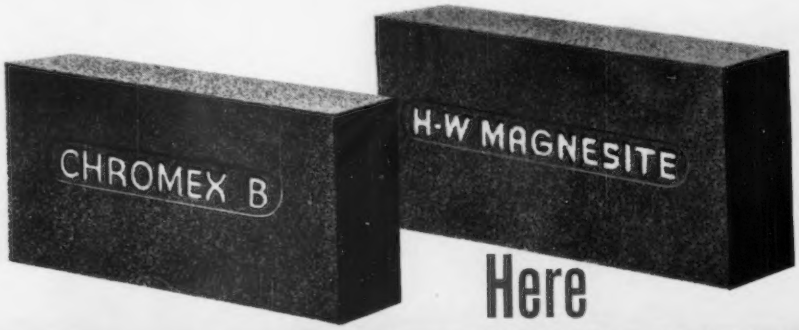

MAINTENANCE-ENGINEERED

**COST LESS** FORD DIVISION Ford Motor Company

**Fender mountings, independent of both cab and grille,** eliminate stress transfers for increased fender life. Each fender is assembled as a unit which includes the headlight panel and apron. The complete assembly is supported at the four points **(A)** as shown at left. Lower supports are on a rubber-cushioned transverse bracket at the front and a frame-mounted bracket at the rear. The upper front sections of the two fender assemblies are tied together by the nameplate panel which is independent of the center section of the grille. The upper rear support is at an angle bracket bolted to the frame. The removal of only nine bolts makes it easy to pull a fender for maximum accessibility to the engine area.

**New triangular cab mounting system (B)** provides increased driver comfort and greater cab durability. Two outboard front mounts, plus a centered "twin" rear mount, form a triangular system that holds the cab stationary while allowing the frame to move independently . . . reducing strain on the cab.

**25% heavier gauge sheet metal** in fenders, cab floor, and toeboard further increases life and provides greater resistance to corrosion.




# Here are two fine-performing basic refractories for copper converters

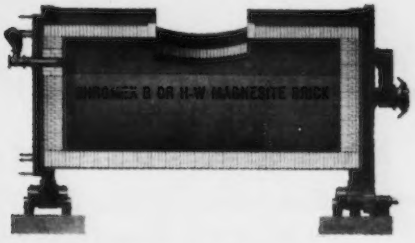
**CHROMEX B** is an extra hard-burned chrome-magnesite brick with high density and low permeability . . . good resistance to thermal shock . . . unusual stability and high strength at high temperatures.

**H-W MAGNESITE** is a superior hard-burned refractory, consisting predominately of periclase (stabilized crystalline magnesia), for the most severe requirements of copper converters. It is dense, strong and volume stable at temperatures far above the highest employed in copper converters.

These quality-controlled Harbison-Walker basic refractories are used also with great benefit in longer life for parts of copper reverberatory smelting and refining furnaces.

## INCREASED PRODUCTION... EXTENDED SERVICE LIFE... REDUCED OPERATING COSTS

Contact Harbison-Walker Technical Service Department for complete application details.



## HARBISON-WALKER REFRACTORIES COMPANY

### and subsidiaries

**World's Most Complete Refractories Service**

General Offices: Pittsburgh 22, Penna. HW 61-23

## How to keep them out of the graveyard longer

Why do some engines die before their time? The answer could be in the lubricating oil you are using. Hundreds of documented case histories show that fleet owners have added up to 50% to the life of their engines . . . using RPM DELO Oil. Special compounding cleans and protects vital engine parts . . . reduces over all maintenance costs. In fact, many fleet owners say "RPM DELO" *is* preventive maintenance. Try it. Your equipment will be rolling for a long time to come.

**STANDARD OIL COMPANY OF CALIFORNIA**
San Francisco 20
**STANDARD OIL COMPANY OF TEXAS**
El Paso
**CALIFORNIA OIL COMPANY**
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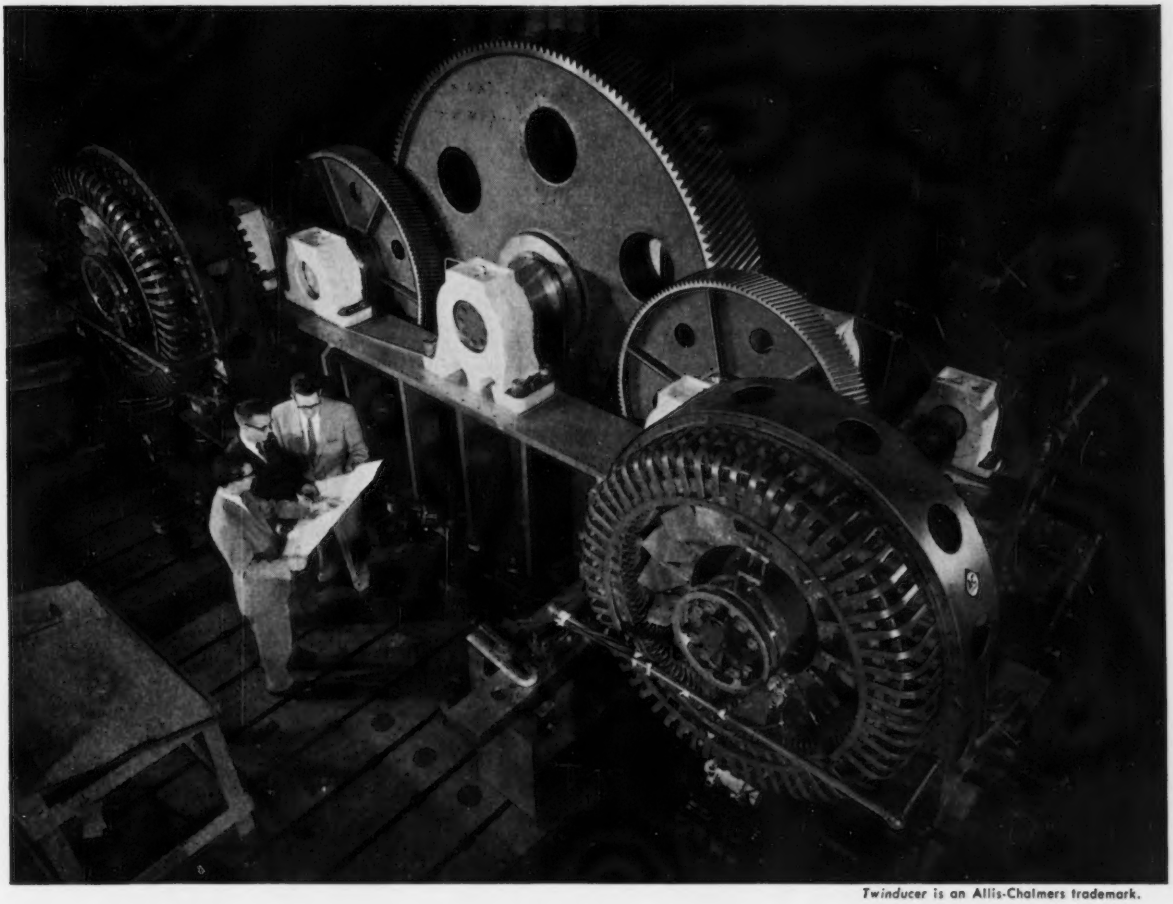
LUBRICATING OILS
RPM DELO

TRADEMARKS "RPM DELO" AND CHEVRON DESIGN ®

# ALLIS-CHALMERS



*Twinducer* is an Allis-Chalmers trademark.

# Full-load demonstration proves 98%-plus efficiency of Twinducer grinding mill drive

**New, twin-motor drive system divides mill load electrically, saves space and installation costs, extends gear-train life.**

To show the high efficiency of the *Twinducer* drive, Allis-Chalmers engineers recently conducted a series of full-load demonstrations at the factory.

Full load was simulated by coupling two *Twinducer* drives. Driver unit was coupled to driven unit. Load on driven unit was two equally loaded generators.

Power input to the motors was measured, and compared with the output of the generators. Efficiencies (exclusive of ordinary motor and generator power losses) were found to range from 98.48% to 98.52% . . . more than twice the efficiency of most conventional mill drives.

The *Twinducer* drive balances the load electrically, through a unique, angular rotor shift of one motor. Result is a drive arrangement that takes less space than other trunnion drives . . . and facilitates automation of grinding equipment. *Twinducer* drive cuts maintenance costs, conserves power requirements and greatly extends gear-train life.

For complete information on the new *Twinducer* drive system, see your A-C representative. Or write **Allis-Chalmers,** Industrial Equipment Division, Milwaukee 1, Wis.

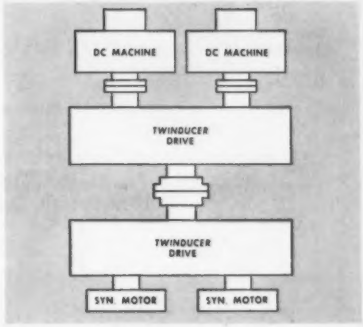
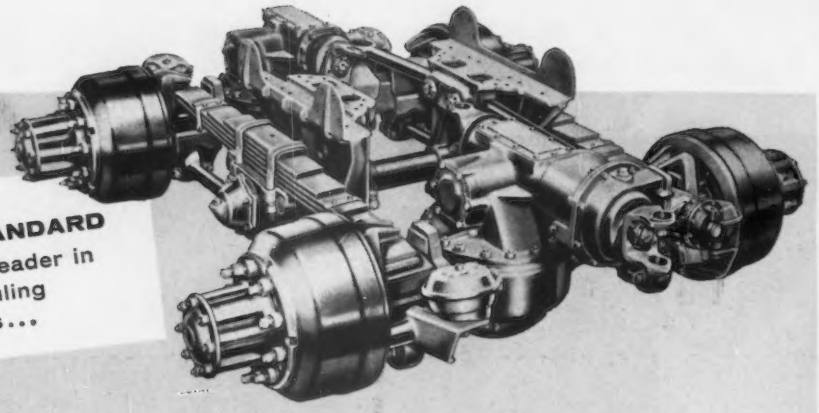



Diagram of **Twinducer** drive demonstration. Load is balanced electrically by a rotor shift mechanism in one of the twin synchronous drive motors. A-1514



**ROCKWELL-STANDARD**
Acknowledged Leader in
Rugged Hauling
Operations...

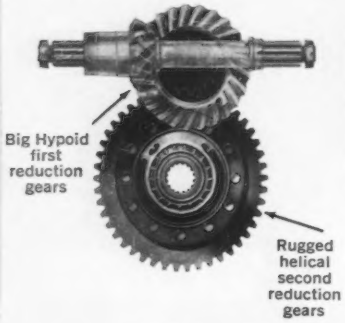
## Here's why Timken-Detroit®

# DOUBLE-REDUCTION TANDEMS LEAD IN TOP PERFORMANCE—LONG LIFE!

Timken-Detroit Heavy-Duty Tandems with Hypoid Helical Double-Reduction Gears are the big favorites for top performance and long life.
Here are some of the reasons why:

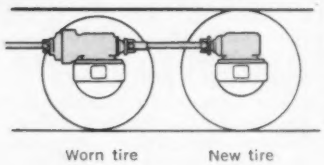
### Rugged Hypoid-Helical Double-Reduction Gearing!

Balanced gearing—with two full-sized gear sets working in series to take an equal share of the load—provides a stronger power train with balanced gear set loadings and the widest range of ratios.



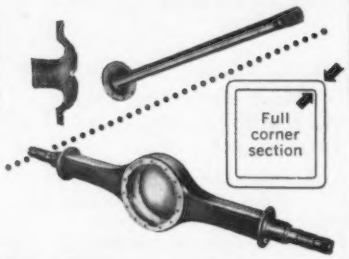

### Driver Controlled Interaxle Differential!

Allows differential action between the axles to compensate for worn or mismatched tires. Both axles do equal amounts of work . . . can be disengaged at any speed, giving positive through drive when better traction is needed. *Straight-Line Through Drive* eliminates prop shaft angularity . . . increases bearing and gear life, reduces maintenance.




### "Torsion-Flow" Axle Shafts and Hot-Forged Housings!

More splines, Torsion-Flow forging, and patented heat-treating processes make Rockwell-Standard shafts the toughest in the industry. Housings are hot-forged from high carbon steel, and are rectangular shaped with full strength corners for greatest strength with minimum weight.




**Timken-Detroit Double-Reduction Tandems come in a wide range of capacities—6 models from 34,000 to 65,000 pounds.**

*Another Product of...* **ROCKWELL-STANDARD CORPORATION**

ROCKWELL R STANDARD ®

Transmission and Axle Division, Detroit 32, Michigan

# BIG SCREEN EXPERIENCE!

Allis-Chalmers knows the most, does the most about solving screening problems. With big-tonnage units like this 8′ x 16′ XH *ROM* scalper. Despite brutal pounding, it keeps producing . . . day after day. It works hard . . . earns more . . . and lasts a lot longer. How come?

*It was built by the experts.*

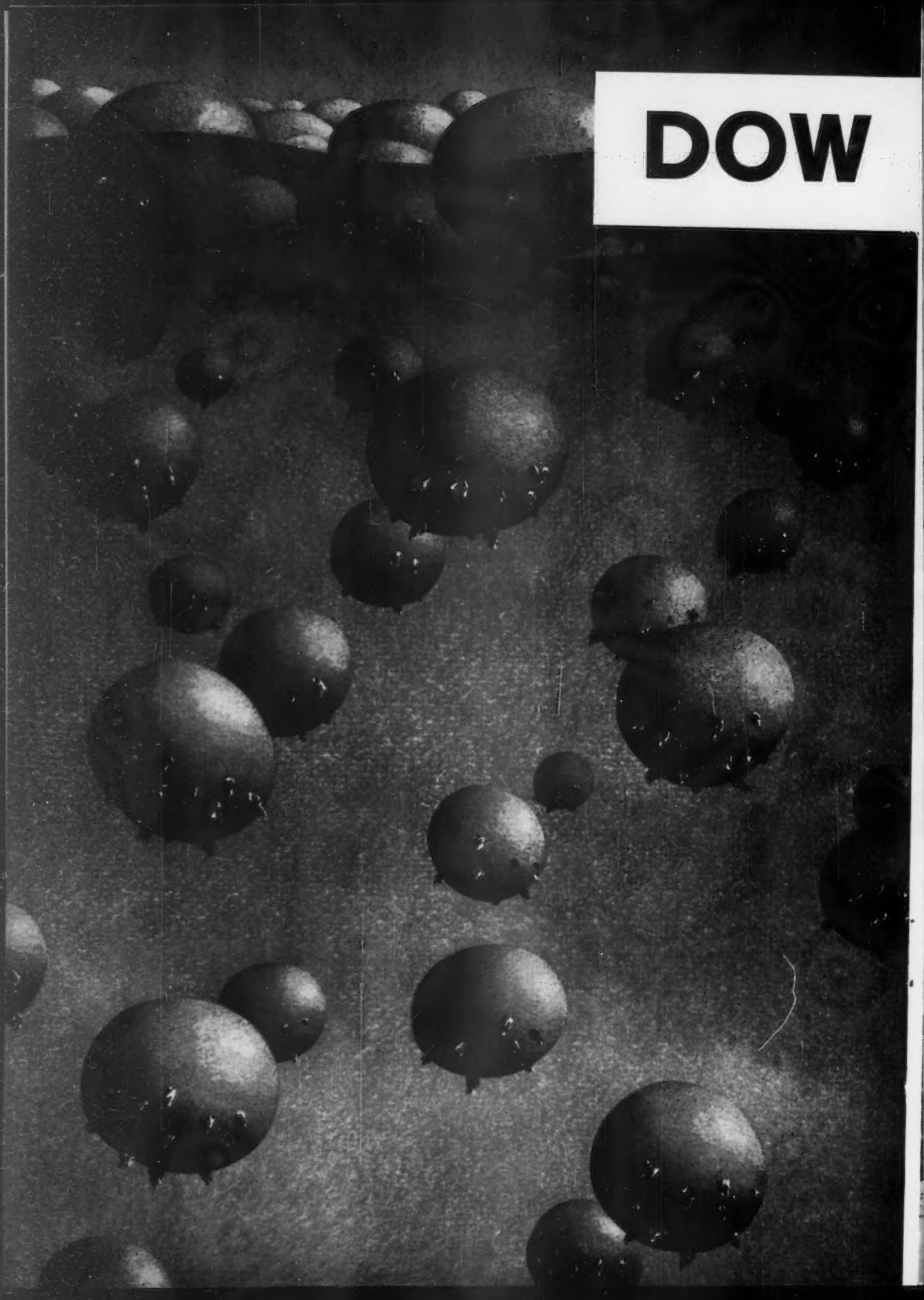
And Allis-Chalmers builds an ever-improving, complete line of horizontal and inclined vibrating screens. Famous names like *Low-Head* horizontal, *Aero-Vibe* and *Ripl-Flo* inclined screens cover the full range of applications — scalping, sizing, rinsing, washing, media drain and dewatering.

*Ask your A-C representative for help with your screening requirements. Or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wis.*

ROM, Low-Head, Aero-Vibe and Ripl-Flo are Allis-Chalmers trademarks.

**ALLIS-CHALMERS**

A-1529


DOW

# mining chemicals

## DOWFROTH and XANTHATES

## SWITCHING XANTHATES MAY CUT COLLECTOR COSTS

COLLECTOR POWER with xanthates is usually considered to be in direct proportion to the number of carbon atoms in the alkyl radical. For this reason, Z®-11 sodium isopropyl xanthate should be, and usually is, a more effective collector than the ethyl xanthates. In many flotation circuits, substituting the newer Z-11 has resulted in a definite reduction in the amount and cost of collector required.

Because of its high collecting power and low cost, Z-11 has become the most widely used collector of all. In any new testing program, Z-11 should receive first consideration—followed by Z-4 sodium ethyl xanthate and Z-6 potassium amyl xanthate. In any process as complex as flotation, however, exceptions are common and eventually all the xanthates should be evaluated.

For some flotation separations it is often advantageous to use a combination of *two* xanthates. For example, one of the ethyl xanthates, Z-3 or Z-4, may be used with an amyl xanthate, Z-5 or Z-6. As ore changes occur, varying quantities may be fed as required to maintain optimum metallurgical results.

Z-200, newest of the Dow flotation agents, is the result of a long search for a better collector for iron-copper separation. Z-200 is a water-insoluble liquid stable in both acid and alkaline pulps. Extensive mill use has confirmed that this product is the most selective copper or copper-activated zinc mineral collector available to flotation metallurgists today. The frothing action of Z-200 often demonstrates a substantial cost saving by reducing frothers required.

## ON FRAGILE FROTHS, GANGUE DROPPAGE, AND RUBBER RUIN

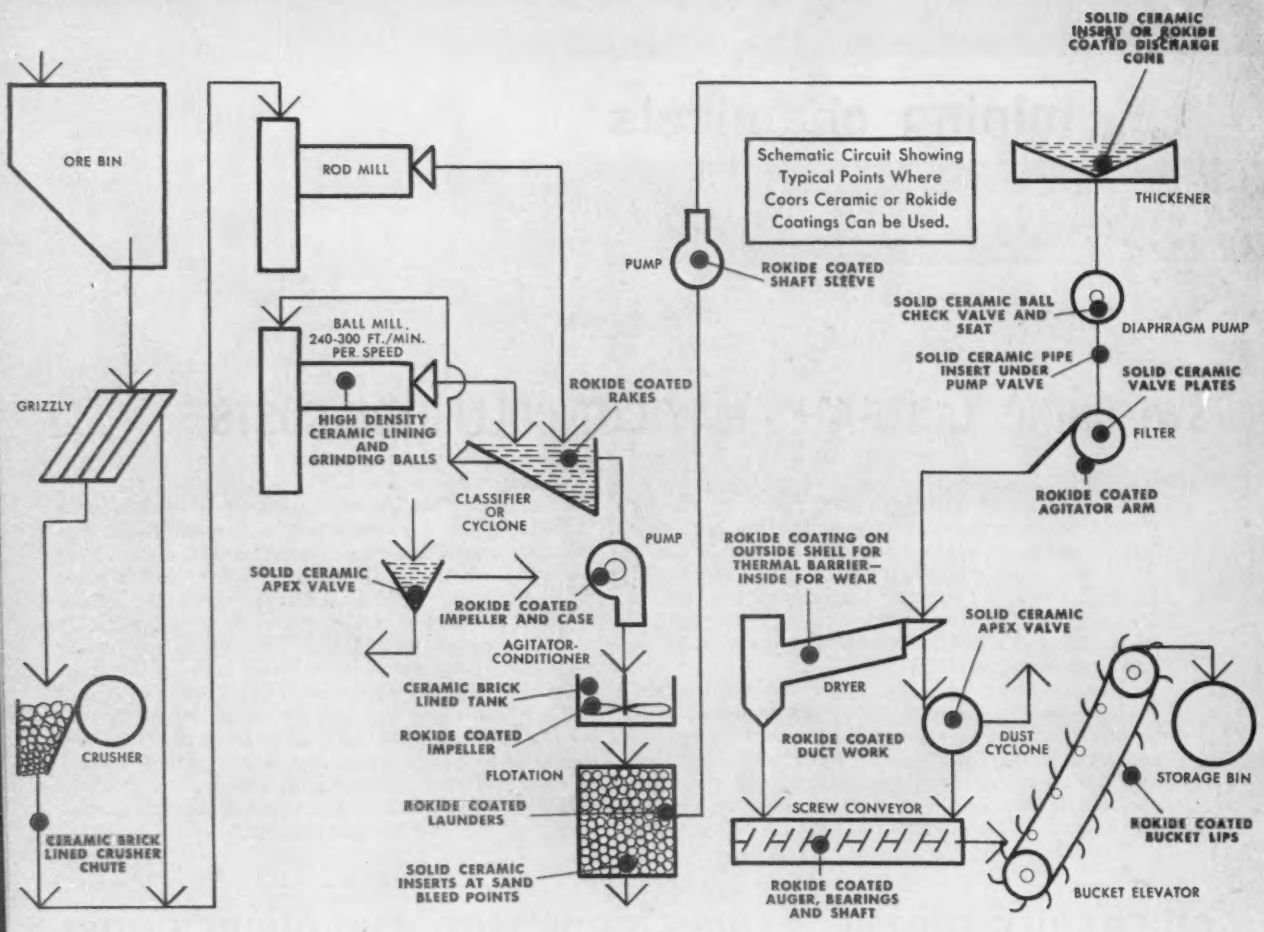
SINCE DOWFROTH® flotation products are completely soluble in water, they may, like Dow xanthates, be added at any required point in the flotation circuit. This also makes the action of Dowfroth especially rapid and more easily adjustable to ore variations. Prolonged flotation stages are possible, giving a good, live froth at the tailing end of the machines with a limited number of frother additions. But despite its stability in the flotation circuit, a froth produced with Dowfroth is easily broken in the launders. The quantity of wash water going to the concentrate launders can also be materially reduced since only a small amount is required to move the froth.

Gangue droppage, being directly related to froth character, is especially good with Dowfroth. Previously used frothers frequently required deep froth columns to allow for gangue droppage, but the fragility of froths produced with Dowfroth yield equal or superior results with greatly reduced froth depth. The result: the effective volume of the flotation machine is increased and greater ore tonnage can be obtained with a given unit.

Frother attack on rubber-covered impellers, stators, and pumps frequently causes swelling and deterioration of the rubber, cutting efficiency and increasing maintenance. A comparison of Dowfroth 250 with other frothers shows that Dowfroth 250 is the least reactive on either synthetic or natural rubber.

Since ores have a way of changing just when you have everything going nicely, Dow maintains a special group of mining and milling experts who can be most helpful when problems arise. Their services are available either in writing or in person. They will be happy to assist you in any problem having to do with mining chemicals. For a copy of our new digest, *Chemicals for the Mining Industry*, write to THE DOW CHEMICAL COMPANY, Abbott Road Buildings, Midland, Mich., Attn: Chemicals Merchandising Dept. 751BD8.

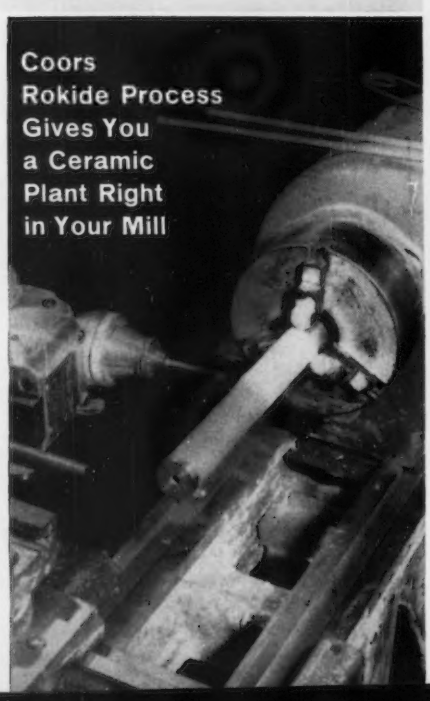
**THE DOW CHEMICAL COMPANY** DOW Midland, Michigan




ALSO: MECHANICAL PUMP SEALS; MULLER WHEELS AND PLATE; METERING ORIFICES

# Solve Wear and Corrosion Problems

Critical wear and corrosion points in your circuit can be protected with Coors high strength ceramic parts or coatings. Solid ceramic parts are sapphire hard (Rockwell 45N 75-81), and strong (over 30,000 psi Tensile Strength, over 350,000 psi Compressive Strength)—providing high resistance to wear and abrasion. The ceramic is virtually inert to chemical attack. Rokide ceramic spray coatings have many of the advantages of the solid ceramic parts. Take a look around your mill and see if Coors Ceramics can help you solve critical wear and corrosion problems. Write for Data Sheet 0001 giving properties of solid ceramic parts—Data Sheet 9000 for Rokide coatings. *Coors supplies solid ceramic lining bricks and grinding balls. Most solid ceramic parts can be ordered through your equipment manufacturer. Coors offers process licenses and material so you can do Rokide coating right in your mill.*




Coors

ALUMINA CERAMICS

Coors Porcelain Company

600 NINTH STREET • GOLDEN, COLORADO

# Here's how TOURNATRACTOR® puts extra savings in your pocket!

## Handles more tractor jobs over a wider area . . . faster

Because of its rubber-tired speed . . . power . . . and mobility . . . Tournatractor gets around fast . . . completes widely-separated assignments at low cost. Thus, you need fewer tractors . . . and the saving is yours.

Get the full story on 218-hp Tournatractor from your LeTourneau-Westinghouse Distributor. He will be happy to arrange a demonstration so you can see the money-saving possibilities in this fast, rubber-tired, heavy-duty tractor. Remember, you now have a choice of Tournatractors . . . electric control or hydraulic blade control . . . speeds to 18.5 mph.

SKIDS EQUIPMENT

WORKS ACROSS TRACKS

Rubber-tired Tournatractor is never more than a few minutes from its next assignment . . . anywhere in your pit or plant area. This drive-anywhere mobility often permits you to eliminate 2 or more crawlers, reduce operating costs *substantially*.

BUILDS STOCKPILES, FEEDS HOPPER

CLEANS AROUND SHOVELS

LEVELS DUMP AREA

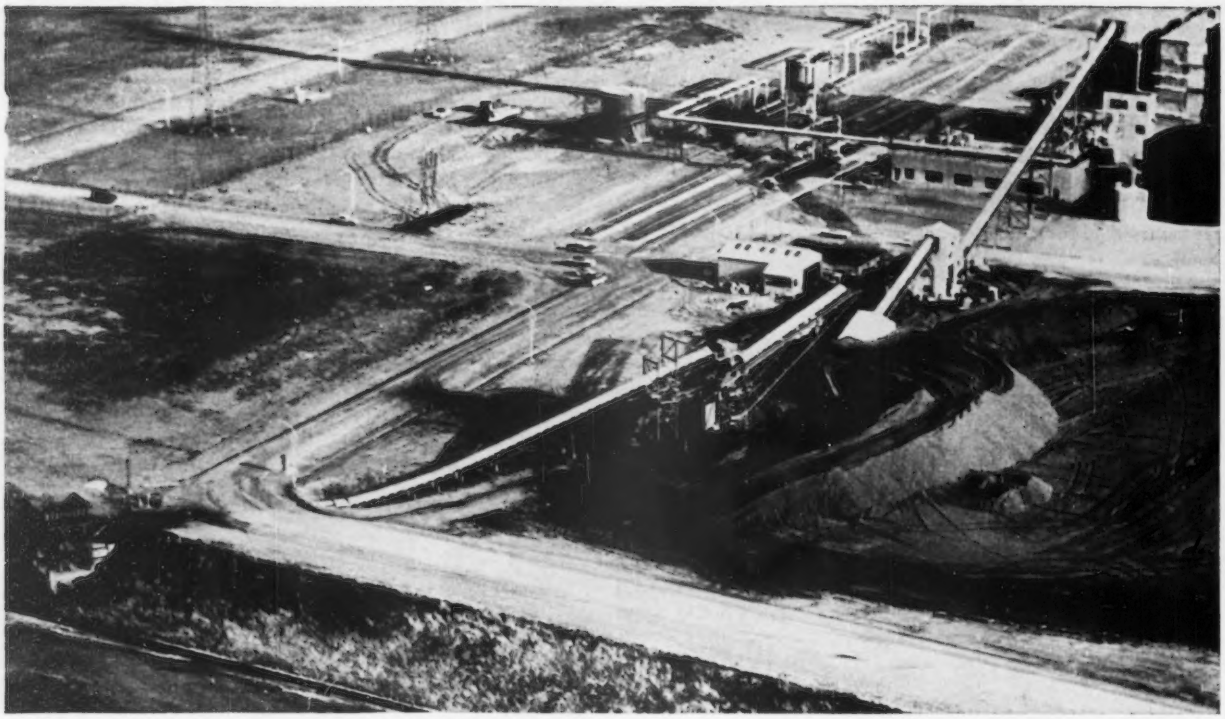
MAINTAINS ROADS, PIT FLOOR

CT-2345-MQ-1

**LETOURNEAU-WESTINGHOUSE COMPANY,** PEORIA, ILLINOIS

*A Subsidiary of Westinghouse Air Brake Company*

Where quality is a habit



All five units in this stockpiling-reclaiming Barber-Greene belt conveyor system are shown here . . . the unloading conveyor . . . cantilevered radial stacker . . . two reclaiming conveyors . . . and the enclosed conveyor atop bunkers that fills bunkers automatically.

*At new Steam Plant in Sarnia, Ontario:*

# AUTOMATED BARBER-GREENE STOCKPILE

**One man controls Canada's highest-capacity steam plant coal handling system**

Dow Chemical of Canada, Limited specified and got a stockpiling-reclaiming belt conveyor system as ultra modern as the rest of its new steam plant at Sarnia, Ontario.

Working as a team, Dow Chemical and Barber-Greene engineers designed an automated conveyer system that can stockpile 20,000 tons of coal in eight hours at 2,500 tph. The bunkering conveyor system reclaims, crushes, samples and weighs coal before delivering it to steam plant bunkers at 440 tph.

Self-unloading ships deliver coal to a special dock on St. Clair River and feed it at high speed into a 20′ x 20′ hopper. The hopper feeds a 60″ x 325′ belt conveyor that moves coal at 670 fpm to a cantilevered radial stacker. This special 110′ stacker with 60″ belt stockpiles in a 150° arc.

Material is reclaimed on a 170′ tunnel conveyor under the pile that feeds the crusher. Tramp iron is removed by a magnetic head pulley on the conveyor, and the coal is discharged into the crusher. A 319′ conveyor fed by the crusher moves the coal over an automatic weighing device to a 115′ tripper conveyor that automatically charges the bunkers.

Get the same very special attention for your bulk materials handling problems, no matter how complex or commonplace, by calling in your Barber-Greene Conveyor Representative.

*Your belt conveyor equipment headquarters.*

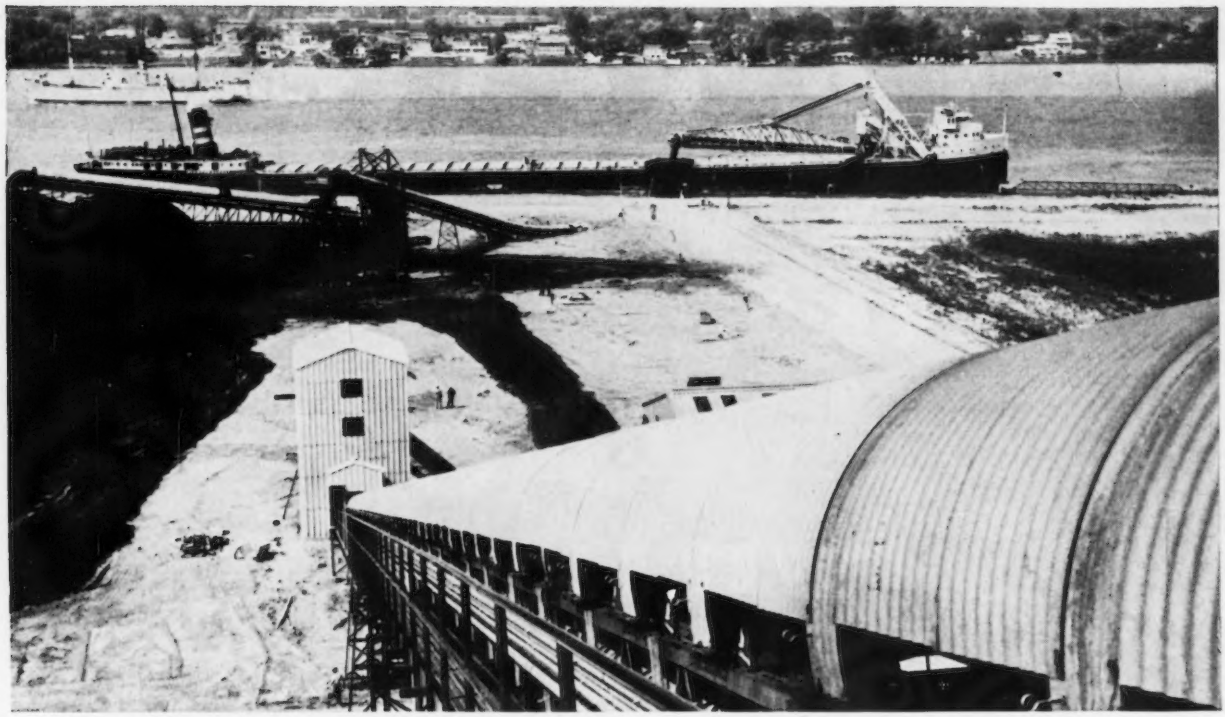
Representatives in Principal Cities of the World

**Barber-Greene** BG

Main Office and Plant AURORA, ILLINOIS, U. S. A.
Other Plants: DeKalb, Milwaukee, Detroit, Canada, England, Brazil, Australia

CONVEYORS • LOADERS • DITCHERS

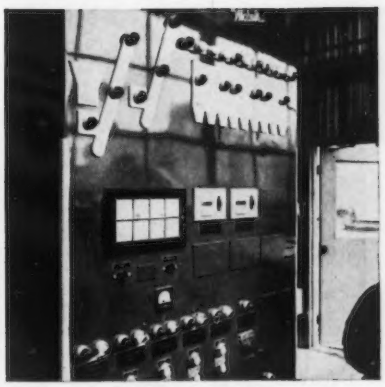
ASPHALT PAVING EQUIPMENT



Huge coal ship spends minimum time at river bank dock because high-speed Barber-Greene stockpiling conveyors can transfer 20,000 tons of coal to stockpile in eight hours. Utilization of many control devices makes system both automatic and safe to operate.

# BELT CONVEYORS COAL AT 2,500 T.P.H.

Specially-designed counterweighted radial stacker is supported only at tail end. By means of level indicator and timer, it automatically moves to new position each time coal reaches head of stacker. Both stacker and conveyor feeding it can be stopped from any point by operator. Conveyor system's 800-1,200 hour lube interval minimizes maintenance needs.

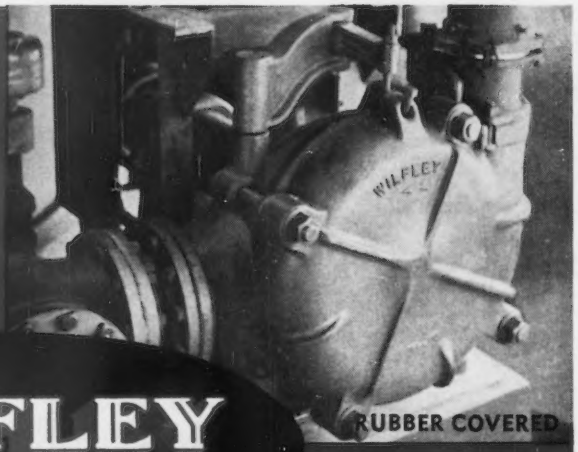


Entire operation is automatically controlled from two master control panels. Panel lights indicate operating status of all equipment in system.

# LONGER

## WEAR LIFE

may be realized with the correct choice in materials of construction for the wearing parts.




RUBBER COVERED

## WILFLEY SAND PUMPS

ALLOY IRON

**WILFLEY** pumps are available with alloy irons, such as White Iron, Ni-Hard and Maxalloy, or interchangeable, soft, abrasion resistant rubber and synthetic elastomers.

The proper application of these materials or a combination of these materials can mean many hours of extended service without down-time for repairs.

INDIVIDUAL ENGINEERING ON EVERY APPLICATION

*Write, wire or phone for complete details.*

"COMPANIONS IN ECONOMICAL OPERATION"

COMBINED STAINLESS STEEL ALLOYS AND SYNTHETIC ELASTOMER

## A. R. WILFLEY and SONS, Inc.

DENVER, COLORADO, U.S.A.—P.O. BOX 2330

NEW YORK OFFICE: 122 EAST 42ND ST., NEW YORK CITY 17, N. Y.

IN THIS 90-TON MOUNTAIN of ore are 200 lb of copper—enough for the plumbing in just one home.

# How Not to Talk to Ourselves

MINING IS CONTINUALLY ON THE DEFENSIVE and frustrated because it just doesn't know how to communicate to the public effectively. At countless mining conventions formulating endless and often fruitless resolutions, we thrash out steps that ought to be taken to promote a strong domestic mining industry and in all this doing, we leave out the one partner who can help us most to obtain constructive action and legislation—the public. *In short, we are talking to ourselves too much!*

All this talking to ourselves nets us results such as these: (1) Wilderness bills, (2) collapse of gold and silver legislation in Congress, and (3) unfavorable tax attitudes towards mining on Federal and state levels.

Now as a refreshing contrast, take a look at the illustration and caption above which appeared in a recent advertisement of the Anaconda Co. Here the public is told that it takes 90 tons of ore to produce 200 lb of copper. You will be surprised to learn how many non-mining people simply don't know that most of our domestic copper comes from ores containing only 12 to 20 lb of copper per ton—and yet copper (New York) sells for less than half the price of a pound of butter (New York).

Now if we took time to tell the public what a magnificent technical job the mining industry is doing to supply the raw materials that make our industrial nation possible, perhaps public pressure would nudge the Federal and state governments to be a little more understanding in tax and public land regulation. Perhaps wilderness legislation could be amended to give back the prospector and miner his one remaining frontier. We certainly should make it clear to the public that current foreign antagonism to expansion by U. S. mining interests plus trends in domestic legislation can easily combine to make the U. S. a second-rate industrial economy within a decade.

If somehow, we could quit talking to ourselves and coordinate the communication potentialities of public relations departments of major mining companies; the activities of numerous national, regional and state mining organizations; the advertising messages of metal producers; corporate reports to hundreds of thousands of mining stockholders; and the mining and technical press, perhaps we might be able to persuade the public and legislative bodies to support mining instead of forcing it out of our borders by taxation and Wilderness legislation.

But all such efforts will be completely futile if the mining industry fails to agree upon what it wants. For example, recent gold subsidy bills before Congress fell flat because they were so divergent in purpose and so poorly drawn. If we need to agree on a starting point, why not promote the establishment of a Department of Mineral Resources and a Secretary of Mines as proposed in the Baring Bill, H. R. 2210 (E&MJ April 1961). This will at least establish a man in Washington who will champion mining's interests as effectively, for instance, as the Secretary of Labor looks out for labor's interests. To achieve this end, we must have public support.

# A Look at Western Iron—Today

WHILE WESTERN IRON ORE PRODUCTION continues to flex its muscles simultaneously with expanding western steel mills, potential ore output remains far ahead of actual demand. Pacific Coast industries still find it easier and cheaper to stock their storehouses with steel from eastern producers than to wait for western foundries to match all their needs. And the lack of enough blast furnaces in California seriously hobbles mine operations in Nevada and Wyoming; few markets for western-made steel mean few markets for western iron ore.

One goad to iron mining progress lies in Japan's burgeoning steel industry. Those mining companies that have cornered a chunk of this market, such as Dodge Construction of Nevada, are about the only ones that show a consistent increase in ore output over the past several years. For the others, imports from Canada, Venezuela (each sent over 15-million tons here in 1960) and other foreign sources have grown to one-third the total ore shipped to U.S. mills last year and mean new competitors for old markets. (For an earlier survey of the West's iron mines see E&MJ, October 1957, p 82.)

But western mine operators should still have little difficulty disposing of nearly all scheduled production to Colorado Fuel & Iron's plant in Pueblo, Colo.; Kaiser Steel's foundry at Fontana, Calif., now the largest steel mill in the west; and the partially-completed U.S. Steel Atlantic City project in Wyo., due onstream late in 1962. Construction of the latter, however, has pointed up several of the problems that can plague western steel developments. Because of long, cold winters, engineers had to plan all working areas and process buildings not only with full heating and insulation, but also with flat roofs to allow prevailing winds to sweep off snow and ice, cutting the danger of slides. And the thinner air at 8300 ft, which lowers the boiling point to 196 F., meant adjustments of all air-cooled equipment and changes in the standard agglomerating operation.

These problems, which can hike total development cost, are worth solving though, when raw materials as well as markets for steel exist. Here prospects are bright: proven reserves of western iron ore look high, and there are three large sources of coking coal in Utah's Sunnyside field, Colorado's Crested Butte and in the Raton Mesa, shared by Colorado and New Mexico. What's more, if direct reduction (see E&MJ, December 1960, p 83) fulfills its promise to revolutionize the iron-to-steel process, some of a steel plant's onerous costs may shrink.

In fact, Western Steel Corp. of Cheyenne, Wyo., has contracted with Stearns-Roger to construct a prototype D-R plant, using the Taylor process, which yields iron powder from a tumbling furnace charged with hydrogen (E&MJ, May 1960, p 150). Company management predicts this direct reduction method will compete at current pig iron prices. And Bethlehem Pacific Coast Steel Corp. of Los Angeles has already started 110-tpd production from the nation's second H-iron plant at its Vernon works. Meanwhile, at Anaconda, Montana, another D-R process, the Strategic Udy, may turn Anaconda Copper's slag piles into steel.

Any improvements can only help to increase western steel capacity and, in turn, increase western iron ore output, which has a backlog of recent discoveries. Nevada alone has 100-million tons of deposits at 60% iron content or better. And, more important, much of this is near rail transportation headed, among other places, towards California's Bay area, where Pacific States Steel has built San Francisco's first fully-integrated steel mill, outside Union City (see E&MJ, March 1960, p 118).

As to just how iron ore production now stands in the West, here is a survey of U.S. operations—with one outside addition. British Columbia, one of Canada's prime ore producers and a major rival for Japanese business, must be included because of the province's geographical proximity and its strong tie-up with western U.S. steel expansion.

## NEVADA:

Currently with 11 iron mines in operation and with an output that constitutes an important part of the state's mining industry. The Mineral Basin area of Pershing and Churchill Counties holds the largest concentration of operations, shipping an average of 11 cars of iron ore daily.

About half of this goes to Japan via the port of Stockton, and the West Coast steel mills take the rest. The future of Nevada's iron ore markets seem assured with the increase of West Coast projects and with the continuing demand for low grade ore in Japan.

**1. Pershing County**

Principal producer in the Mineral Basin is Dodge Construction Co. which has been shipping 15,000 tons per month—up from 9000 in 1957—to Japan. The firm employs 31 men, has a small upgrading plant in operation and hauls the ore 25 miles to Colorado, where it is loaded on railroad cars.

**2. Humboldt County**

Will Austin and Charles Rowe, together with Whit DeLaMare, are this county's largest iron ore producers. Austin and DeLaMare make up the Jackson Mountain Mining Co. and, with 18 men, operate the Iron King mine 75 miles northwest of Winnemucca, Nevada's only underground iron producer. In the same district, as Jungo Contractors, the two work the Humboldt Iron Mine, a strip operation employing 31 men. Both mines produce about 500 tpd of the state's highest grade iron ore which is trucked 30 miles to the Western Pacific siding at Jungo and then shipped to the Youngstown Sheet & Tube mills at Gary, Ind.

**3. Elko County**

Austin, Rowe and DeLaMare also move 500 tpd from Nevada's newest mine at Barth. During the last year to reach the deposit, engineers and workmen diverted the Humboldt River channel, allowing the removal of overburden from an estimated 80,000 tons of iron ore, which, mixed with higher grade output from the Jackson Mountain mines, is scheduled for the Japanese market.

**4. Douglas County**

Standard Slag employs 47 men to produce ore from the Minnesota mine, 16 miles northwest of Yerington. The company operates an upgrading mill at the site and sends about 8000 tons per week to West Coast steel mills.

**5. Churchill County**

U. S. Steel, which earlier in 1960 had paid Mineral Materials Co. $900,000 for an ore concentrator, has now laid out $4.5-million more for iron deposit claims held by Mineral Materials. Columbia Iron Mining, a subsidiary of U.S. Steel, conducted large-scale drilling tests throughout the area which showed enough ore potential to warrant purchase. However, U. S. Steel gives no indication of resuming iron ore production, halted in early 1960, from its new Mineral Basin holdings, although the Southern Pacific Railway, which owns alternate sections in the same region, has discussed joint construction of a pelletizing plant. On its own, Southern Pacific may build a spur line from Parran if it feels the railroad's ore holdings are worth operating.

**6. Lyons County**

U. S. Steel has also acquired extensive mine property here, especially in the Pumpkin Hollow district where the company recently filed on 67 placer claims and 99 lode claims. Utah Construction, nearly as active, has carried on a drilling program for iron ore, which resulted in 32 placer claims in the Dayton-Silver Springs area.

## WYOMING

**7. Platte County**

Colorado Fuel & Iron Corp.'s Sunrise mine, the only one active in the state at present, now produces only four days a week, ships out 52,000 tons of ore a month. But general manager Myron Sisson is counting on the steel business to continue to pick up "so we can get back to a five-day-a-week production soon." Last August, Sunrise was shut down for six weeks and again for nearly four weeks more in late November because of excessive stockpiling at CF&I's Pueblo, Colorado, blast furnaces. Right now, mine engineers are in the midst of a two-year project, designed to deepen the 750 ft shaft to 900 ft.

**8. Fremont County**

Construction tempo at U. S. Steel's Atlantic City development was stepped up this spring with the coming of good weather. More than 700 workers started on the job, with another 300 expected in the summer. Company officials say the multi-million dollar processing unit is 25% finished and expect completion in the next few months of the 76-mile railroad spur from Winton Junction, near Rock Springs, to Atlantic City. During the winter, while Arthur G. McKee Co., which is responsible for the agglomeration plant, and U. S. Steel's American Bridge, erecting all steel at the site, discontinued work, Pomeroy-Bechtel continued general construction and grading the railroad bed. Dings Magnetic Separator Co. is filling one of the largest orders in its history for Atlantic City: 12 triple-drum rod mill cobbers, 36 single-drum ball mill roughers, and 12 triple drum finishers.

**9. Albany County-Laramie County**

Union Pacific Railroad has hired Koppers Co. to conduct a feasibility study, with this objective: location of an iron ore reduction plant in the Laramie area. Koppers will investigate possible sites, labor conditions, power availability and water and transportation facilities over the next several months. Reason for the survey is the large number of leases Union Pacific holds in the Iron Mountain area, site of extensive low-grade ore deposits.

## MONTANA

**10. Judith Basin County**

Young Montana Corp., located 17 miles southwest of Stanford, Mont., shipped between 24,000 and 28,000 tons of iron ore from May to October 1960 via the Great Northern Railway to Great Falls. But, aside from an emergency order for 1000 tons in February, operations shut down for the winter and had only started picking up production again for the spring and summer months.

**11. Broadwater County**

Harris Brothers Mining Co. at Radersburg now mines about 48 tpd of ore, ships this to the Ideal Cement Co. in Trident for use in cement manufacture. This open-pit operation may increase production if missile base development in Central Montana requires more steel.

**12. Madison County-Beaverhead County**

The Department of the Interior has mapped two potentially valuable iron deposits: the Carter Creek, about 10 miles east of Dillon on the counties' boundary; and the Kelly, on the east flank of Madison County's Ruby Mountains. Both deposits are in a sequence of highly metamorphosed Precambrian rock, mostly gneiss and quartzite, and the Carter Creek iron ore, in the form of magnetite, is sufficiently coarse grained to be concentrated.

## UTAH

**13. Iron County**

Utah Construction and Mining Co. has completed a $1.3-million upgrading plant at its Iron Springs open pit, 12 miles west of Cedar City. Engineers designed unit capacity to move 120 tons of ore per hour, using dry, magnetic cobbing methods for all ore down to the minus ¼-in. size and a wet, magnetic process for smaller particles.

*(Continued on p 90)*

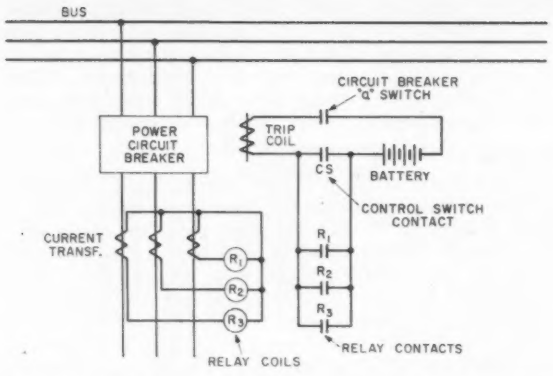



FIG. 1. Dc trip with overcurrent relays. When current from current transformer exceeds relay setting, the relay starts to operate. After a time delay depending on value of current relay, the contact closes to energize the trip coil and trip breaker. More complex types of relays are often used with dc trip, but the plain over-current is shown here for the sake of simplicity. The control switch contact is operated manually.

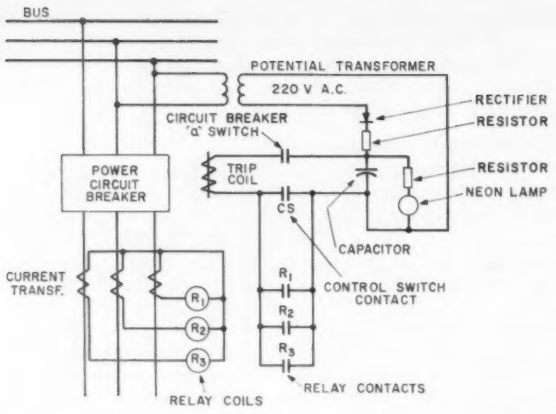



FIG. 2. Capacitor trip with overcurrent relays. Capacitor is maintained charged by energy from a potential transformer connected to source side of breaker. When overcurrent occurs, a relay contact closes to discharge the capacitor through trip coil and open breaker. Manual control switch, usually provided, also trips breaker by discharging capacitor through trip coil. Neon lamp indicates capacitor charged and ready to trip.

# How to Choose the Right Power Circuit

H. B. ASHENDEN

WHEN ELECTRICAL POWER CIRCUITS become overloaded or faulted, a circuit breaker should open the circuit and interrupt the current. If the circuit is not interrupted, damage to lines and equipment may result. Added to the cost of replacing damaged equipment is the cost of down-time. Thus, a breaker is a critical part of a circuit.

A properly designed circuit breaker depends on the function of the circuit and the cost. Because several different types of circuit breakers are available, at different costs, the merits and limitations of each will be detailed.

Most power circuit breakers are held closed by a mechanical latch. To break the circuit, a plunger or armature of a small solenoid (or solenoids) strikes the latch and trips it by impact. Because a breaker is tripped rather than opened, small solenoids are usually called trip coils.

The energy which operates these small solenoids must be dependable and available, regardless of any fault or other abnormal circuit condition. The tripping method is determined by the energy source regarded as satisfactory for the particular application.

Three reliable energy sources which trip power circuit breakers during fault conditions are a storage battery, a capacitor, or a current transformer.

Mr. Ashenden is an engineer for the Boston, Mass. Works of Allis Chalmers Mfg. Co.

In place of a current transformer, a coil can be connected in series with the line to energize the small tripping solenoid. For practical reasons, series coils are used only on low-voltage power breakers rated 600 v or less. At higher voltages, current transformers, which provide a small low-voltage current proportional to the primary current, are better.

Breakers may also be opened by energy from a low-voltage ac source, but this source is not reliable during abnormal conditions. Low-voltage ac trip is used only for switching in combination with a current transformer because a low voltage ac source is almost invariably tied in directly or indirectly with a circuit which the breaker is protecting. During a severe fault, voltage may become very low with the result that energy to trip will not be available when it is most needed.

## Tripping Methods Described

Energy for various types of trips is supplied by:

**1.** A storage battery controlled by relays. This is commonly referred to as dc trip (Fig. 1).

**2.** A capacitor charged from a low-voltage ac source and controlled by relays. This is usually called "capacitor trip" (Fig. 2).

**3.** Current transformers connected directly to small trip solenoids *without* control by relays. Time delay may be provided by hydraulic or air dash pots attached to plungers of solenoids. Clockwork mechanisms are sometimes used (Fig. 3).

**4.** Current transformers controlled by circuit closing relays and reactors (Fig. 4).

**5.** Current transformers controlled by circuit opening relays (Fig. 5).

**6.** Low-voltage ac source — usually used only for switching but occasionally controlled by ground relays.

Numbers three, four and five are usually called "current transformer trip" but can also be identified as "ac trip." Number six is customarily "ac potential trip."

Not all of the above types of trip are available in all sizes and types of breakers. Usually, practice of the various power circuit breaker manufactures differs a little but, in general, the following is customary:

For large outdoor oil circuit breakers (rated above 69 kv), only a dc trip is available.

For intermediate voltage outdoor oil circuit breakers, rated 23 through 69 kv, a dc trip and capacitor trip are usually available although the dc trip is preferred. All types of trip are available for small outdoor breakers rated at 15 kv. The same is true for indoor oil breakers, rated 15 kv and below.

Dc and capacitor trips are usually used for magnetic breakers rated 5

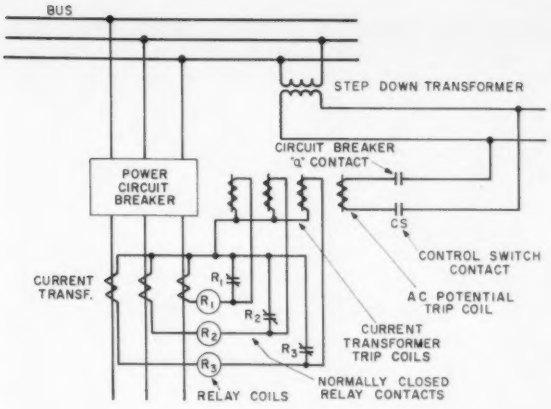



FIG. 3. Current transformer trip without relays. Current transformers are directly connected to trip coils. When secondary current exceeds pick-up setting, plunger is drawn into coil to release latch and trip breaker. Plunger motion is restricted by dash pot for a short time depending on magnitude of current. The ac potential trip coil shown is provided in some cases for manual switching from a remote location.

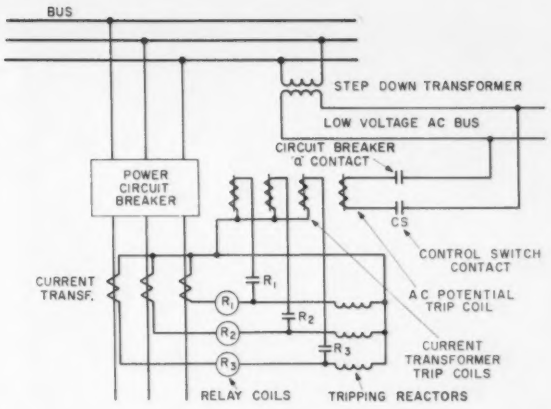



FIG. 4. Current transformer trip with circuit-closing relays and tripping reactors. During normal operation, secondary current from current transformer circulates through relay coils and reactors. When an overcurrent occurs, a relay operates to close its contact and transfer some of the current to trip coil to open breaker. The impedance of reactor must be higher than that of the trip coil and reactor must match trip coil.

# Breaker

kv although all methods of trip are available. For larger breakers of this type, rated 15 kv, only dc and capacitor trips are offered.

## Application Determines Trip Method

The selection of a trip method depends on its application; thus each should be considered individually. Where any of several methods are adequate, the user's opinion may be the deciding factor. The user should note the location of the breaker with regard to the system and the size and type of breaker, e.g., whether it is a large station with many breakers or a single breaker in an unattended substation, or if it is an entrance breaker for an industrial plant. In addition, the degree of accuracy and selectivity deemed essential, reliability required, and the cost considered justified are important.

Of these, cost is most important, otherwise a storage battery controlled by relays would always be used. The storage battery is the most reliable energy source and provides the best in accuracy, selectivity, and degree of protection. It is however often the most expensive source, especially where only one or a very few breakers are installed.

In large stations with many breakers, a control battery is provided for all control functions and all breakers are tripped by energy from this battery as a matter of course. In isolated locations with only one or a very few breakers, one of the other methods of trip from an ac source will often be adequate. The relatively large cost of a storage battery, plus charge, installation, and maintenance will not be economically justified.

Statistics, compiled from a survey of a large number of breakers of all types shipped during 1956 and 1957 show how different types of breakers are used.

**A.** Large outdoor breakers, rated above 69 kv— all dc trips.

**B.** Outdoor breakers, rated 23 through 69 kv, approximately 99% dc trips and 1% capacitor trips.

**C.** Small outdoor breakers, rated 15 kv— 65% were provided with dc trips, 25% with capacitor trips and 10% with ac trips.

**D.** Dc trips are used with about 94% of magnetic breakers and about 6% utilize capacitor trips. In addition some 2% to 3% of breakers rated 5 kv are provided with ac trips. This is less than 1% of the total number of magnetic breakers shipped.

**E.** On indoor oil breakers the approximate figures are dc trips, 55%; capacitor trips, 9%; and ac trips, 36%. The considerable use of ac trips on these indoor breakers is due to the rather large number of small manually-operated breakers — approximately 30% of the total. Many of these were furnished with ac trips without relay control.

The above figures indicate that dc trips are preferred. This is because the dc source of tripping energy is entirely independent of the circuit controlled and protected by the breaker. Storage battery installations with associated charging equipment are highly reliable if well maintained, and maintenance is simple and infrequent. However, tripping from an ac source is preferable (1) when single breakers are in isolated locations where maintenance is difficult or (2) when installations of one or a few small breakers are such that the cost of battery, charger, installation, and maintenance is a considerable part of the total.

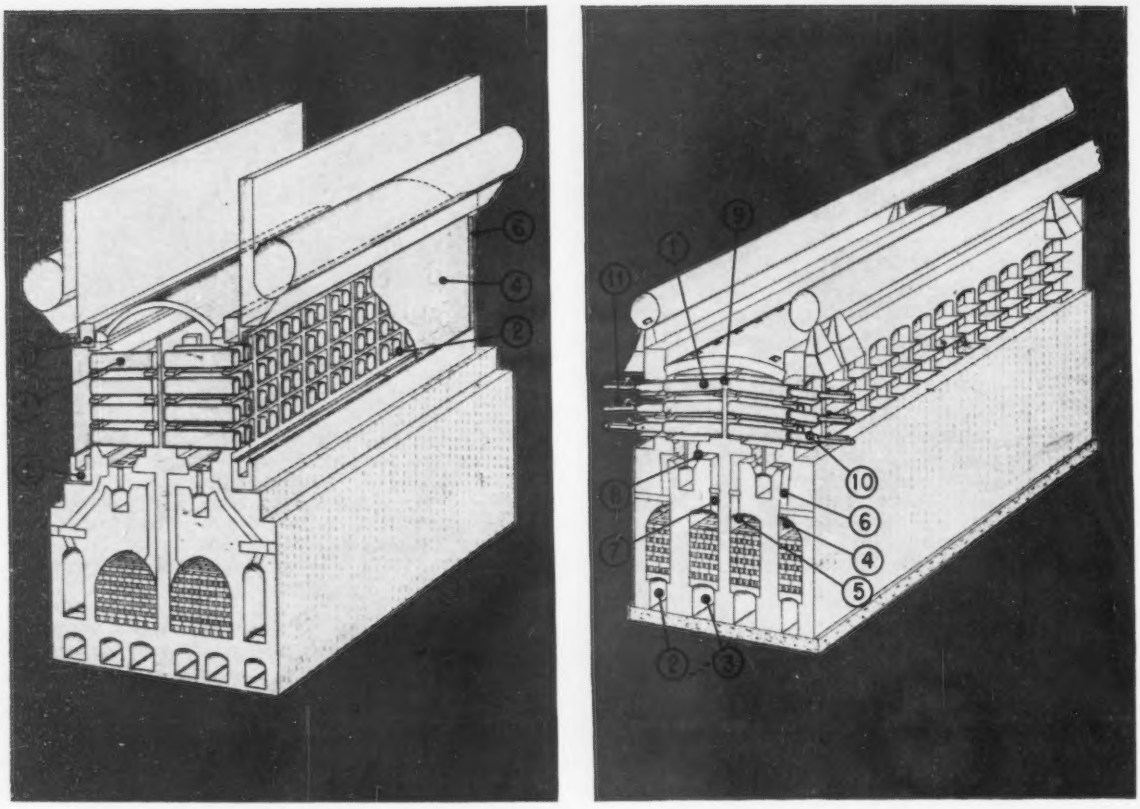
## Merits and Limitations

A dc trip has no limitations provided the battery is properly maintained. It can be used with any type of relaying and is the most reliable. However, unless the battery is already installed and available for tripping additional breakers, it will have the highest over-all cost.

A capacitor trip which can also be used with any type of relaying, is the most versatile of the methods of tripping from an ac source of energy. It has no limitation as far as automatic reclosing is concerned since the device charges the capacitor sufficiently to trip in the interval between clearing the fault and reclosing the breaker contacts. Its principal limitation is that it will not trip immediately after the line has been de-energized for longer than a minute or two. About 12 cycles at normal voltage are required to recharge the capacitor sufficiently to trip after an outage of longer than that duration. Often this fact is not important but should be considered in the application of capacitor trip.

Although the capacitor trip can be

*(Continued on p 96)*




NEW OVERPELT-TYPE horizontal retort furnace (above left) for distillation of zinc and cadmium includes: (1) retorts, (2) refractory-brick dividing walls, (3) skewback heat exchangers, (4) sheet-metal curtain (condenser front), (5) zinc trough, and (6) side supports of furnace. Former conventional or unmodified design (right) consisted of: (1) retorts, (2) gas ducts, (3) air ducts, (4) checkers, (5) checkers, (6) gas-intake ducts, (7) air-intake ducts, (8) flues, (9) dividing walls between back-to-back retorts, (10) condersers, (11) prolongs, shown on condensers of old design (above).

# Improved Design Doubles Output Of Horizontal Retort Zinc Furnaces

JIM MORRISON, McGraw-Hill
World News, Bonn, West Germany

EXPERIMENTS STARTED as long ago as 1924 and intensified after World War II were used by Companie des Metaux d'Overpelt, of Overpelt, Belgium. to develop a new type of horizontal retort furnace for distillation of zinc. Performance of the new type furnaces was so successful that older conventionally-built furnaces were completely replaced as they became obsolete.

By dispensing with the individual condensers for each of the retorts and the cumbersome prolongs, in favor of a common tappable condenser serving the complete side of the furnace, and by recovering and using the carbon monoxide gas produced during the reduction of zinc oxide, the company has experienced five major advantages:

1. Improved furnace performance with better load factor of muffles.

2. Higher yields of zinc and cadmium.

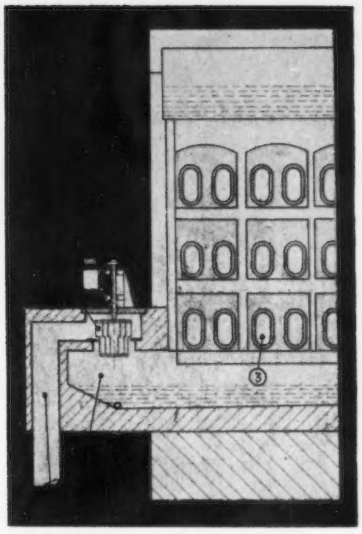
3. Substantial saving of fuel.

4. Substantial reduction of labor force.

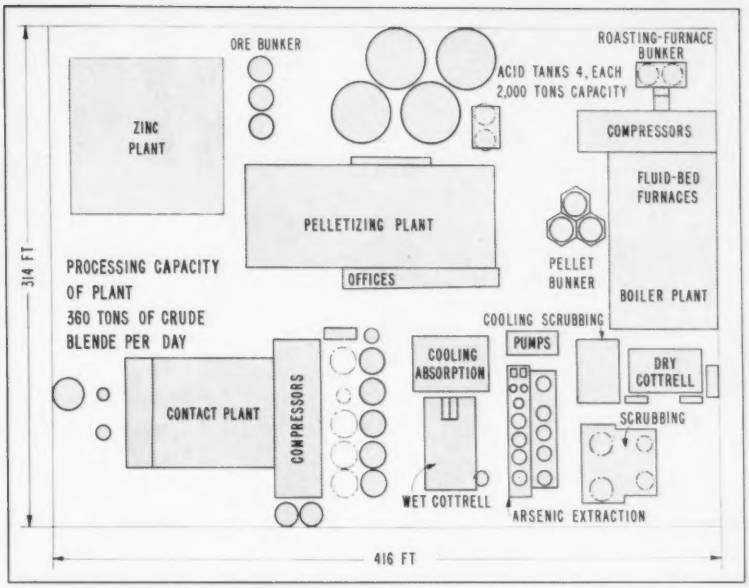
5. Improved furnace operating conditions.

## Furnace Design

On the Overpelt furnaces, open ends of 144 retorts arranged in four-high rows on each side of the furnace mouth into two common condensers. Fire clay is packed between the retorts to form a continuous wall the length of the furnace interrupted only by the open ends of the retorts. This wall acts as the back of the condenser. The condenser front is formed by a continuous sheet-metal curtain stretching from top to bottom and from end to end of the furnace, and arranged at a slight incline to give a wider clearance at the bottom than at the top between the open ends of the retorts and the metal curtain. Fire-clay lined troughs flank the entire length of the furnace on both sides. These are installed at the lower end of the sheet-metal curtain and between the curtain and the back wall of the condenser. The sheet-

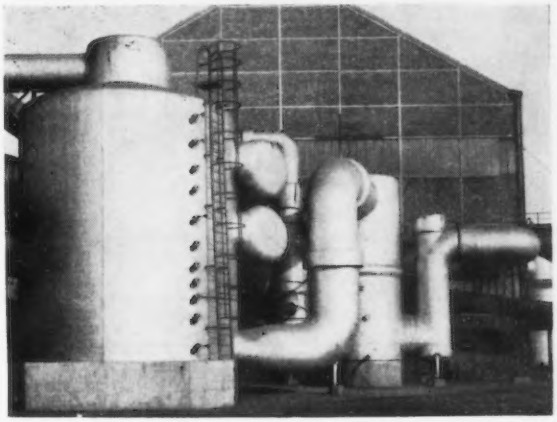


ROTATING BAFFLE in line of gas flow precipitates droplets of zinc contained in the reaction gases centrifugally. Details above include: (1) zinc trough, (2) rotating baffle device, (3) retorts, and (4) line to firing fuel.



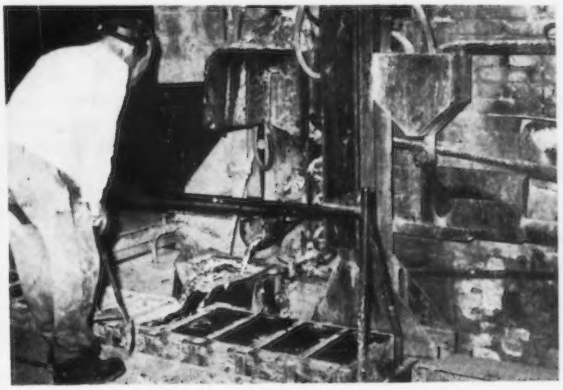

OVERPELT ZINC WORKS includes the modernized horizontal retort plant, ore pelleting and roasting plant, boiler plant, and contact sulphuric acid plant. Capacity of plant is 360 tons of crude blende per day.

FRONT-END of fluid-bed roasting furnace. Full cadmium-content of zinc contents is retained in pellets during and after roasting.

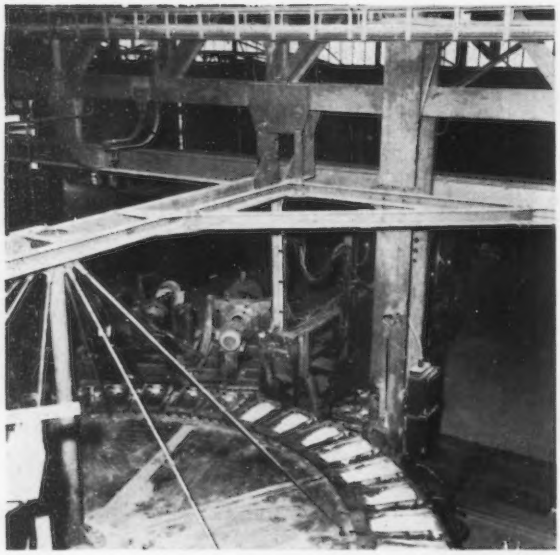


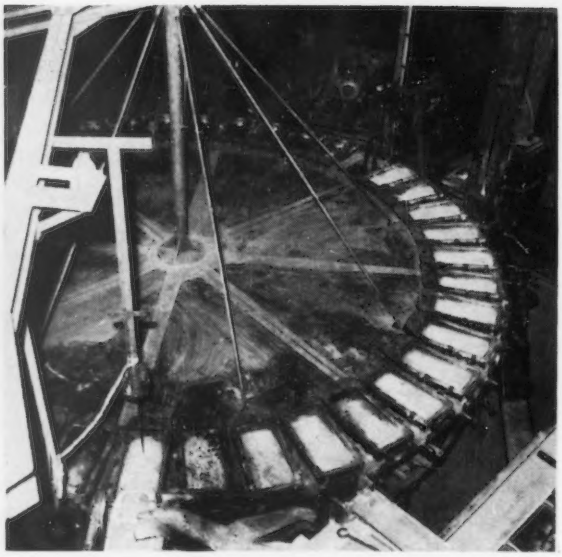
CONTACT-PROCESS sulphuric-acid plant and heat exchangers at the Overpelt zinc works were constructed in the open.

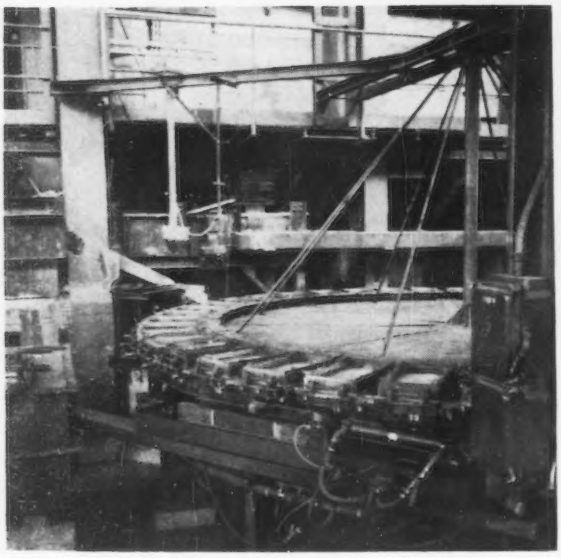
RESIDUE EXTRACTION machine scoops contents of retorts and discharges it into trough running length of furnace.



COMMON ZINC TROUGH is tapped three times a day. Molds for the molten zinc are mounted on a movable wheeled carriage.







HOW REFINED ZINC IS TAPPED. The table (upper left) has indexing device which controls filling, rotation and discharge. Molds at left edge of wheel are full of zinc, while those at right have been emptied into trough-like discharge point in center. Contact feeler (upper right photo) at pouring spout actuates a switch when mold is filled. Note mold in rear which is being emptied. Indexing device (lower left photo) starts flow of metal to mold; stops flow when it is filled; rotates table to new position, and regulates discharge of mold at proper instant. Note discharge point detail at lower right photo.

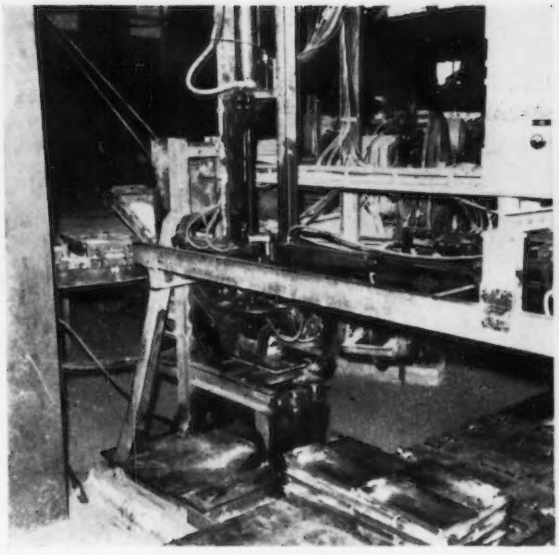
metal curtain can be raised and lowered by electric hoist to give access to the retorts for charging and discharging.

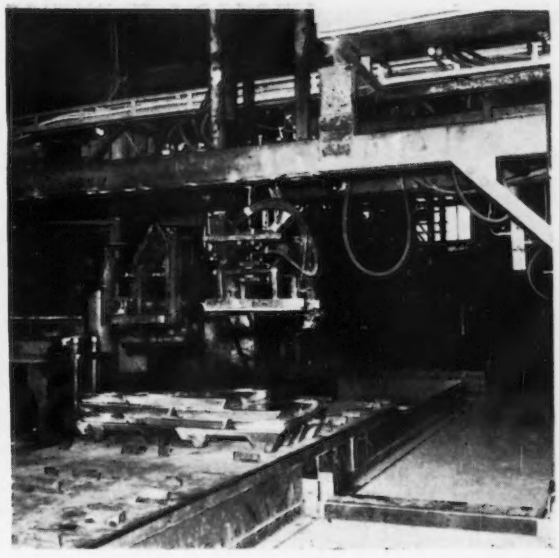
## Waste Heat Boiler

The top end of the curtain rests against a wide box-section girder acting primarily as a heat-catching boiler and secondarily, as a skewback to assimilate the end thrust of the arched roof of the furnace. Steam generated in the heat exchangers is cycled to the plant steam system.

A second loosely-suspended sheet-metal curtain with four rows of hinged doors located to correspond with the position of the muffles, acts as a heat shield for the furnace men during charging and discharging. This shield is suspended freely from the furnace-shop roof, and can be swung towards or away from the furnace easily.

Zinc vapor discharged from open ends of the retorts condenses to liquid metal in the proximity of the sheet-metal curtain and the cooled roof skewback, and collects in the trough from which it is tapped at intervals. The uncondensed gases contain carbon monoxide and zinc dust. The heat content of the carbon monoxide developed in the reaction is about one-third of the heat content of the producer gas required to fire the muffles. Prior to recycling the CO to the furnace firing system, reaction gases are led through a duct at one end of the furnace. Fine droplets of zinc contained in the reaction gases are precipitated centrifugally out of the gas stream by a rotating baffle plate installed in the gas flow. Precipitated zinc droplets collect in the zinc trough and are drawn off with the bulk of the liquid metal.





HOW PNEUMATIC STACKER OPERATES. A slab (photo at left) has just been discharged into a short chute and awaits pick-up by programmed-cycle pneumatic grippers. Grippers are retracted towards rear by pneumatic plunger, and the slab is swung to the required stacking position before it is lowered onto the stack. Angle-iron stops on movable baseplate keep stack steady while it is being advanced to baling and weighing station. After 40 slabs have been stacked, the baseplate moves along automatically to receive the next stack of slabs. Cycle permits slabs to cool off before being baled.

A second higher-speed rotating baffle in series with the first separator precipitates the zinc in the gas stream which is collected in a separate container for recharging into the retorts. Purified carbon-monoxide is fed under pressure through an automatic pressure-regulating valve into the fuel stream entering the firing chamber of the muffle furnace. Design of the furnace is conventional. Flow of air and gas is alternated every 15 min.

Working floors at each side of the furnace are raisable by electric winch to bring mechanical charging and discharging equipment level with the open ends of the retorts.

By employing a common condenser serving all the retorts along one side of the furnace, the company has eliminated time-consuming sealing of individual retorts with clay. Retort size has also been increased from the conventional three cubic feet to more than four cubic feet. By eliminating individual condensers and the accompanying sheet-iron prolongs, the company says that it has avoided limitations inherent in their use pertaining to retort capacity, zinc content of the charge and heating rate. Temperature is regulated chiefly to obtain as complete reduction of the charge at the end of the heating period as possible.

After modification, capacity of one Overpelt furnace has been increased from four tons of zinc per day to eight tons per day on the same base area. Thermal efficiency of the modified furnace has been improved by about 33%, and the amounts of zinc and cadmium escaping reduction have been reduced by more than 3% of the total production. Steam generated in the boilers built into the arched-roof girders amply meets the steam requirements of the whole furnace installation and of the pottery producing retorts.

On unmodified furnaces working side-by-side with the new common condenser types, yield per furnaceman per day increased 2½ times with the new type as compared with the man-shift yield of the old design. Mechanical charging and discharging coupled with liquid-metal tapping at one end of the furnace only, has lightened the work of the furnacemen to such an extent that workers 60 years of age or older are still employed at the Overpelt furnaces.

## Ore Preparation

Ores barge-shipped to the plant in the form of flotation concentrates are premixed with a zinc sulphate binding agent. Zinc sulphate is obtained by treating residues from the roasting plant with sulphuric acid. The mix is then pelletized to small nodules ranging between 0.019 to 0.150-in.-dia. These are dried in horizontal rotary kilns.

The new two-parallel ore-preparation installations at Overpelt feature fully-automatic operation plus complete mechanization of various processes. A single man controls the passage of the ores from the bunkers to the roasting furnace via mixing, premixing, pelletizing, drying and bunkering processes. The ore-preparation installations feed two fluid-bed roasting furnaces each designed to handle 180 tons of blende every 24 hr. The roasting process is designed to retain the full cadmium content of the blende in the pellets. This and cadmium recovery with a bare minimum of losses in distillation as an alloy in the liquid metal, has enabled Companie des Metaux to close down and dismantle its expensive-to-run and sometimes hazardous cadmium extraction plant formerly used for treating the dusts contained in the roasting-furnace gases.

Hot gases from the roasting furnaces generate sufficient steam in an adjacent boiler plant to drive a company-owned generating plant. Steam yield per ton of blende is 1,900 to 2,200 lb superheated at a live steam pressure of 600 psig. Electric power produced is more than sufficient to operate the complete pelletizing, roasting and contact acid installations. Surplus power sold to local utilities and users amounts to more than 8.5-million kwh per year.

Furnace and boiler plant operation are fully automatic. Only two men are required per shift to supervise the running of this section. After passing through wet and dry Cottrell precipitators and an arsenic-removal installation, roasting-furnace gases are cycled to a contact-process sulphuric acid plant yielding 66° Bé acid.

Five men and a supervisor per

shift run the Overpelt plant from crude-ore bankers to contact acid plant.

## Retort Charging

Coal, screened under ¼-in, is mixed with the pelletized and roasted ore in a ratio of about one-part coal to three parts ore. The ore-reducing fuel mixture is distributed into air-tight bunkers arranged almost in line with the tops of the furnaces. When the material is about to be charged into the retorts, the bunkers are fed with compressed air at a pressure ranging between 68 and 75 psig. A long flexible and armoured hose with an ID of about three-inches is connected at one of its ends to the outlet of the pressurized bunker—at the other end, the hose is fitted with a discharge nozzle and a hand-operated valve. Retorts are charged by inserting the nozzle into their open ends, and opening the valve. Ore and reducing fuel are packed uniformly and compactly into the retorts.

With the heat shield in place and the condenser curtain up, furnace-charging personnel move up and down the lines of retorts, opening the hinged flaps in the shield to gain access to the open retort ends. After the lower two rows of retorts have been charged, the working floor is electrically raised to a convenient height to give the furnacemen and charging nozzles access to the two upper rows of muffles.

To fully exploit advantages of the raisable working floors installed along both furnace sides, Companie des Metaux have developed a unique type of retort discharging machine or residue extractor. Seen from the front, the machine looks every much like a four-barrel field gun, each of the stubby barrels housing a half-round scoop mounted on the end of a long, square metal bar. Retorts are cleaned out individually by advancing and retracting the scoops. Push-buttons are provided on the machine control panel to enable the machine to be propelled sideways along the furnace to bring the residue-extracting scoops in line with the open ends of the retorts. Height of the working floor can also be controlled from the same panel.

After lining up four scoops, the furnaceman switches on an automatic control by which the four scoops make a pre-set number of movements in and out of the retorts. As the fully-laden scoops are retracted, hinged flaps shaped to fit the inside contours of the scoops will drop into place and scrape the residue out and into a residue trough running the length of the furnace below the level

ZINC BLENDE PELLETS are roasted in the fluid-bed furnace. Hot gases produce sufficient steam in boiler adjoining the furnace to generate the company's power requirements.

of the working floor. A feature of the Overpelt extraction machine is its low weight of less than two tons, and its relatively small size (length 7¾-ft, width 5½-ft, and height 6-ft) to allow it to be easily maneuvered on the raisable floors and between the rows of furnaces.

## Metal Refining and Casting

The spelter tapped three times per day from the furnace condensers is refined to a 99.995 plus percent grade by fractional distillation in a New Jersey type vertical furnace or refluxer. Companie des Metaux has modified its refluxers to run on heavy fuel oil instead of the usual producer gas. Fuel oil to fire the furnaces is preheated by steam and brought to its final atomizing temperature by a finely-regulated electric heater. Hot air used in the furnaces heating the refluxers at Overpelt is preheated by waste gases.

A new zinc-refining and cadmium-recovery plant installed recently at Overpelt is fully automated and equipped with the modern mechanical-handling equipment. Blocks of unrefined zinc entering the plant are stacked on special trolleys which are wheeled into position in front of the melting pot. A timed-cycle hydraulic plunger moving in a horizontal plane pushes the top block off the stack into the feed mouth of the melting pot. As the plunger retracts, it actuates a second plunger located under the stack. As this plunger moves upwards it will lift the stack sufficiently to bring the next block of zinc in line with the mouth of the melting pot. The cycle is repeated until the stack is exhausted, the lower plunger retracts, and the trolley will be moved forward to bring the next stack of blocks into position over the lifting plunger.

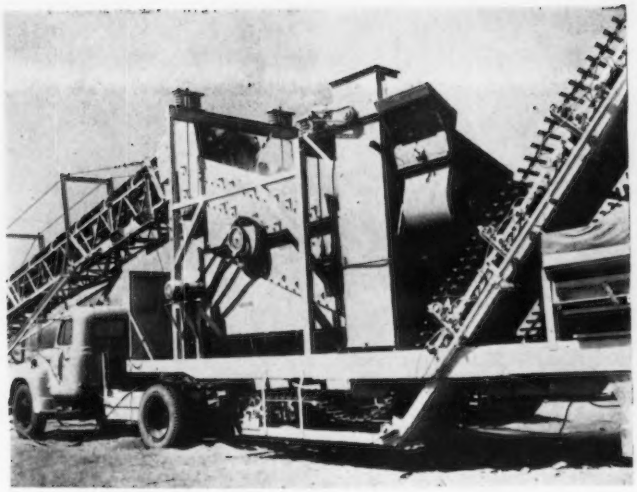
Liquid metal from the refined zinc pot is poured continuously into molds arranged round the circumference of an oversize indexing table. The tilting movement of the pouring spout is controlled by an electric contact feeler arranged to contact the surface of the liquid metal in the mold as this reaches the required filling height. As the spout tips backwards to stop the flow of liquid metal it actuates a pneumatic mechanism which moves the table round to bring the next mold into position under the pouring spout. The table is moved by a forked arm on the end of a horizontally-moving pneumatic plunger engaging with one of a series of studs spaced equally round the circumference of the table. During pouring, the table is braked to prevent movement.

At their outer ends, molds are hinged to the edge of the indexing table, the inner ends of the molds, i.e. the ends facing towards the center of the table, have been purposely widened out to a substantial flange to facilitate the ejection of the cast block of metal from the molds. As the mold with its solidified block of refined zinc reaches the discharge point it is thrust upwards rapidly by a fast-moving pneumatic plunger. But, because the mold is hinged to the table top at its outer edge, it will be swung violently through a 90° arc so that the wide flange on the mold strikes heavily against a metal stop to eject the block of zinc out of the mold and down a short chute to the stacking machine.

The first, second, third, and fourth, and 41st, 42nd, 43rd and 44th molds arranged around the indexing table are special types for casting zinc blocks with square feet and cutaway portions wide enough to take the forks of a fork-lift truck.

The pneumatic stacker has a programmed operating cycle. As the blocks come down the chute they are picked up individually by a set of pneumatic grippers which lift the block and rotate to bring this into the required stacking position. Forty blocks form a stack weighing one metric ton which is baled and fork-lifted to the dispatch bay.

By automating its refining equipment and introducing mechanical-handling aids, Companie des Metaux has made substantial savings in labor. In the new automatic refinery, twelve men split into three working shifts, produce 35-tons of refined metal a day. Companie des Metaux estimates that by automating its refining installation it has been able to cut the labor force by nearly 50%.



PORTABLE PLANT screens, dries and concentrates gold from desert placer ground in Arizona. Capacity of plant is 50 to 100 cu yd per hr. Larger units are planned. Small gold table at right cleans-up concentrates of larger unit.

# Dry-Land Dredge Extracts Desert Gold

UNITED PLACER INDUSTRIES is mining placer gold in the arid San Domingo and Weaver areas within 50 miles of Tucson, Ariz., with a new dry-land dredge that is expected to demonstrate the feasibility of extracting gold from vast Western gold-bearing desert lands that have heretofore defied economic exploitation. Mrs. C. Geraldine Freund, president of U.P.I., confidently predicts that the new unit can help restore the U.S. to its former position of being a "foremost gold producer."

The new dry-land dredge shown above was christened the "Geraldine" in honor of the company president. It was developed after five years of research and experiment by Kelsey Boltz, graduate mining engineer of the Colorado School of Mines, and Donald Wright, a third-generation miner with experience in mining gold, uranium and other minerals.

In current operations, placer gravel is picked up by a 2½-yd front-end Allis-Chalmers tractor loader and discharged onto a grizzly which scalps off plus 6-in. rock. Minus 6-in. material is fed to the concentrator over a 50-ft inclined conveyor belt which discharges onto triple-deck vibrating screens. Top-deck screen oversize goes to waste. Through-screen products go up a drag conveyor covered with a battery of butane-fired infra-red heating units which drive moisture out of the sand. Final moisture is quickly aerated away and the dried material drops onto six electrostatic separator tables. The dry air stream passing over the gold imparts electrostatic charges preferentially to the gold particles which adhere to a table screen, while gangue is blown off the end of the table by the continuous stream of air passing over the table.

Concentrates from the tables are cleaned up on a small electrostatic table which is identical in operation to the larger units installed in the dredge. Gold-bearing sands are fed to the small clean-up model through a hopper which feeds the electrostatic table. Here the gold particles collect with surprising rapidity at the upper end of the sloping screen, while black sands and other gangues are carried off to the lower discharge end of the table. See illustration above, right.

Capacity of the dredge now operating is 50 to 100 cu yd. per hr. It is regarded as a development model which will demonstrate the ability of the unit to perform efficiently over a sustained period, and which at the same time gives the operators a chance to bulk sample the placer holdings. In experimental runs thus far, gold losses have in no case exceeded 10%. U.P.I. plans to build larger dredges in the near future, with capacities of 500 to 1000 cu yd per hr or greater. The dredge can produce by-product materials as well.

United Placers has leased or owns some 25,000 acres of placer claims, of which 2400 acres are in the Weaver property, and 16,000 in the San Domingo section. The Weaver property is estimated to contain roughly 750-million cu yd of placer ground running 30¢ to $3 per yd. San Domingo reserves total about 100-million cu yd of gravel of lower grade, but are still profitable to mine.

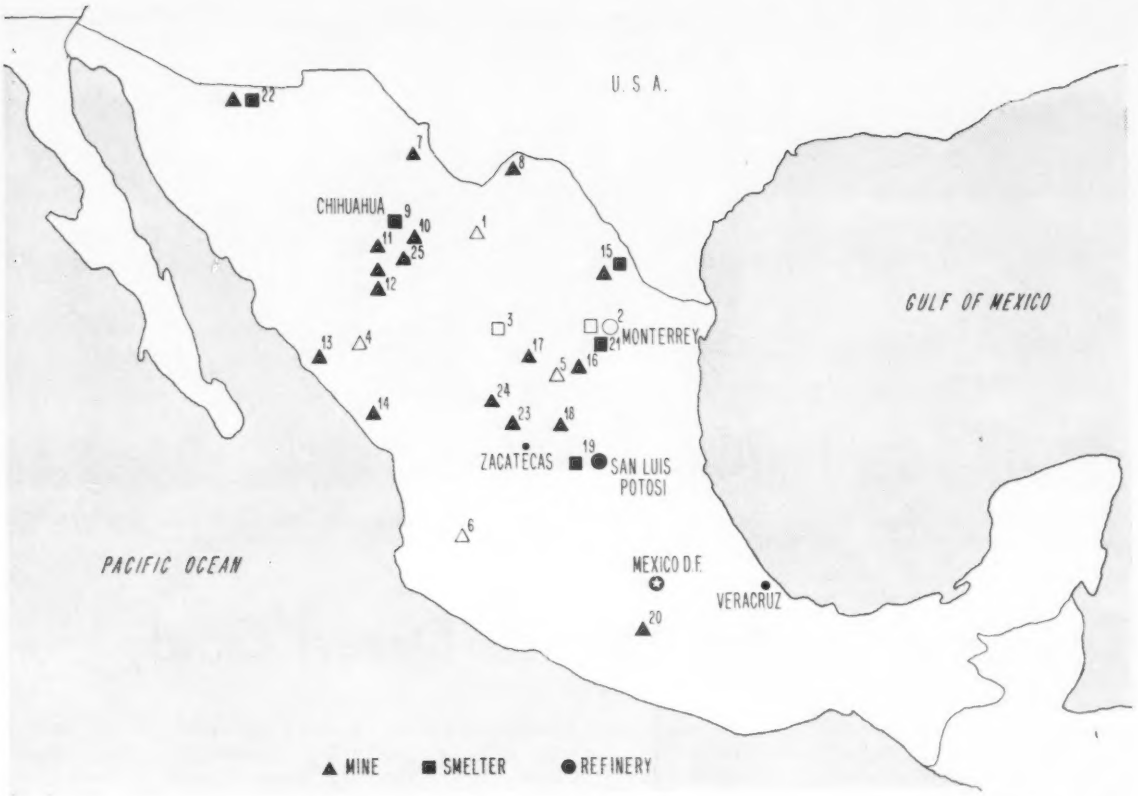
Queried as to the purpose of a press conference recently held in New York, Mrs. Freund said that U.P.I. wanted to clarify certain erroneous reports about their new operations, and that the company considered the new concentrating process to be of great historical and economic significance to the gold mining industry of the U.S. U.P.I. is not seeking public financing at this time, nor is it building the new machine for sale to mining companies.

Patents relating to the unique manner in which electrostatic forces are imparted to the gold and to the separating technique involved are being applied for by U.P.I.

Power for the dry-land dredge is supplied by a 60-kw diesel-electric plant. Butane consumption of the infra-red heaters is about 10 to 12 gallons per hr.

Company engineers estimate that present cost of production ranges from 45 to 55 cents per yard, but believe that this cost can be decreased by improved earth-moving techniques, etc., to as low as possibly 25 cents per cu yd.

Since some of the deposits exceed 100 ft in depth, it is possible that large-scale low-cost earth-moving equipment such as the digging wheel could eventually whittle down operating costs appreciably. Administrative offices of U.P.I. will be in Chicago.




Penoles
1) Laguna del Rey
2) Monterrey lead refinery and smelter
3) Torreon smelter
4) Topia
5) Avalos
6) Calabaza

Asarco
7) Plomosas
8) Encantada
9) Chihuahua smelter
10) Santa Eulalia
11) Parral
12) Santa Barbara
13) Nuestra Senora
14) Rosario
15) Rosita mine and smelter
16) Cedral
17) Conception del Oro
18) Charcas
19) San Luis Potosi smelter and refinery
20) Taxco
21) Monterrey lead refinery

Anaconda
22) Cananea mine and smelter

Fresnillo
23) Fresnillo-Plateros
24) Sombrerete
25) Naica

San Francisco Mines
26) Frisco Mine

WHITE SYMBOLS indicate former Penoles properties now invested as 49% of the new Metalurgica Mexicana Penoles.

# Penoles Properties Become Part of The First Mexicanized Mining Company

MIKE EIGO

PETER WEAVER

A NEW mining company, an announced $14.4-million expansion and a mine consolidation have been the results of the first "Mexicanization" of properties formerly 100% owned by U.S. capital in Mexico. Under the new law, a company which is 51% owned by Mexican nationals is entitled to a 50% reduction in production taxes and an equal cut in export taxes.

Mr. Weaver, formerly Mexico City Bureau Chief for McGraw-Hill World News, has joined the Washington News Bureau as raw materials specialist for E&MJ in the Capital. Mr. Eigo is managing editor of E&MJ.

• Metalurgica Mexicana Penoles, the new company, was created with the investment of $8.16-million by a group of Mexican industrialists and the investment, by American Metal Climax, of its Cia. Penoles mines and plants. The cash investment represents 51%, the mining, smelting and refining properties 49%, of the new firm.

• The expansion will take place as follows: $12-million to build a zinc smelting and refining plant at Torreon, $2.4-million to construct a sodium sulphate plant at Laguna del Rey.

• The consolidation took place last month with the purchase of the Fresnillo properties in Mexico for $55-million. That veteran silver and base metal producer produced more than 1-million tons of lead, zinc, silver and gold ore from its Fresnillo, Plateros, Naica, Sombrerete and Ziapan properties in 1960.

Actually, the formation of the new company was well along before the passage of the "Mexicanization" law by the government in February 1961. Negotiations to bring Mexican capital into the old Penoles organization first began in 1957. Talks were held again in 1958 and final agreement was achieved in September 1960. Formal signing of the agreement in April 1961 followed intensive study of the new

THE FIRST MEETING of the board of directors of the new company in Mexico city was attended by: (front row, left to right) Bernard Rohe; Manuel Senderos; Hugo de Neufville; Raul Bailleres, chairman; Jose A. Garcia; Enrique Madero; and Jose Campillo. Standing: Carlos Sanchez Mejorada, secretary to the board; Ernest Rose; Enrique Madero, Jr. alternate; Luis Latapi, director of Credito Minero y Mercantil; Alberto Bailleres, alternate; Hector Flores E., comisario; Pedro Sanchez Mejorada, alternate; Agustin G. Vales, alternate; and Manuel Escobedo, a Mexico City attorney.

law and arrangement of the particulars of the agreement. Operation of the various properties, for instance, will remain the responsibility of substantially the same personnel who have been running Penoles.

The 51% ownership is represented by Raul Bailleres, a leading Mexican industrialist, head of Credito Minero y Mercantil and owner of the Moctezuma breweries, who organized the group. The cash investment will be used for capital equipment and the proposed expansions and was paid one-half in cash in June with the remaining $4.08-million due within two years.

Construction of the zinc refinery at Torreon will create a capacity of 30,000 tpy and the sulphuric acid plant at the same site will have an annual capacity of 60,000 tons. Of the $12-million to be expended at Torreon, some $8-million is expected to come from bank loans now being negotiated. The $2.4-million sodium sulphate plant at Laguna del Rey will be financed by company funds and loans from Mexican and U.S. banks.

The directors of the new company gathered in June for their first board meeting (see photo). The Mexican ownership, besides Sr. Bailleres, includes Jose A. Garcia, a leading mining engineering consultant; Carlos Trouyet, financer; Manuel Senderos, president of Seguros la Comercial, one of Mexico's largest insurance companies; Roberto Gaza Sada, of the Sada family industrial complex in Monterrey; and Enrique Madero, of the Madero family interests, of Saltillo.

Directors representing the "B" shares of the new company are: Hugo de Neufville, president of the Amco division of American Metal Climax; Ernest Rose, also of Amax; Alfonso Diaz Garza, head of Banco Internacional; Bernard Rohe, Amax general manager for Mexico; Jose Campillo, head of Mexico's Mining Chamber; and Manuel Escobedo, Mexico City attorney. Carlos Sanchez Mejorada, also an attorney, is secretary to the board.

In the past, foreign-owned mining companies in Mexico have suffered a disadvantage in world markets because of stiff export taxes. Now, Mexicana Penoles and any other "Mexicanized" companies will get tax rebates, also called "subsidies" from the government. Also, Mexicana Penoles is complying with the government's wish to industrialize Mexican mining, aiming finally at the production of finished metal for export instead of ores. Many industry leaders also feel that great economies can be effected by combining some of the various units — such as the Penoles-Fresnillo arrangement, approved last month by the latter's stockholders.

A similar purchase, of the old San Francisco Mines of Mexico property, was also reportedly being considered by Mexicana Penoles last month, but no such arrangement with the Union Corporation of London subsidiary and its base metal mines in Northern Mexico has been announced. Other Mexican groups are also interested in Frisco.

## Asarco's Negotiations

American Smelting & Refining Co., the largest holder of mining properties in Mexico, also appears to be moving toward "Mexicanization." Asarco has been negotiating with Banco Nacional, Mexico's largest banking chain, for some arrangement whereby Mexican nationals might purchase 51% of the newly consolidated "Compania Minera Asarco, S.A.," a product of the U.S firm's combining all its mines and processing plants (nine separate companies) under one corporate entity.

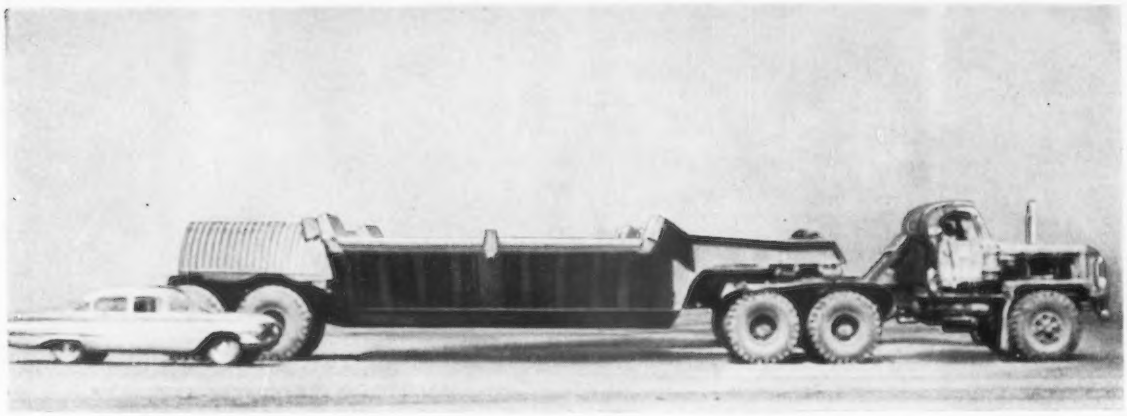
Despite optimistic statements from Mexico City that the deal for "Mexicanization" of Asarco's holdings were "about 90% complete" at mid-July, sources in the U.S. said only that negotiations had been held. The value of Asarco's vast Mexican holdings was at one time estimated as high as $150-million.

To the north, Cananea Copper has also changed its name—to Compania Minera Cananea—and is also reported considering re-corporation moves. Cananea is more than 90% held by Anaconda Co. In its case, the impetus toward "Mexicanization" is considered not so great since Cananea sells all its output within Mexico and therefore has not felt the pinch of high export taxes.

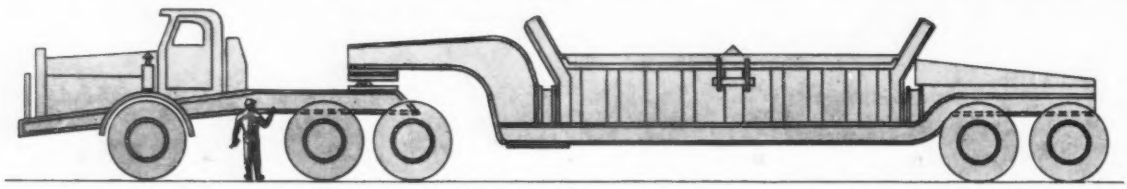
While the creation of Metalurgica Mexicana Penoles is not a typical "Mexicanization" project, since it was well under way long before the law was presented to the Congress, it is considered extremely significant to the future of the mining industry in Mexico, and possibly in Latin America.

Mining personnel in Mexico City speak of a new vitality in the industry, with expectations of improved relations with government, labor and business. The creation of the new company is significant, too, in that it marks a change in the traditional reluctance of Latin American capital to join in mining enterprises.

Credit for the successful completion of the long negotiations is shared by Sr. Bailleres and his associates for their belief in the industry and in the technical talent which is to be found in Mexico, and by the management of American Metal Climax, particularly the late Hans Vogelstein, who was a pioneer supporter of the concept.



A GIANT ON THE MESABI, this 85-long-ton-capacity truck was designed to increase efficiency at Reserve's Peter Mitchell Pit.



HIGH LOAD CAPACITY per horsepower and elimination of truck-mounted dump mechanisms are important features.

# Reserve's Giant Trucks Pay Off in Efficiency

BASED ON PERFORMANCE RESULTS from three 85-long-ton capacity trucks, Reserve Mining Co. will add six more of these giants to its Minnesotta taconite pit.

The trucks, 72-ft-long tractor-trailers, were modeled after standard 45-long-ton capacity units already in operation. These smaller side-dump units were originally selected in place of 22-ton end-dump trucks because they gave over double the load capacity with the same size engine.

Although tractor-trailer units are generally restricted to grades below three per-cent in cold climates, this restriction presented no problem in Reserve's sprawling, shallow pit. Furthermore, since Reserve does little stripping, most pit production is side-dumped by a stationary hook directly into a 60-in. primary crusher. By using the hook, Reserve has eliminated the need for expensive dump mechanisms on the trailers.

Although the big trucks are rated at 85 long tons, loads up to 100 tons have been hauled and 90- to 95-ton loads are common. The 30-mph speed is about the same as the smaller units.

Another important benefit of the big truck is that its weight gives a much smoother ride. The smoothness of the ride coupled with a roomy cab, comfortable seats and good vision, encourages operators to maintain high efficiencies. While main haul roads to the crusher are well-graded, uneven bottoms around the production shovels caused truck operators to slow up.

At the time Reserve decided to switch to the 85-ton units, no manufacturer made a truck that big. Since Reserve mines a material harder and more abrasive than most steels—requiring almost all production equipment to be rebuilt at the mine—the company has accumulated heavy machine building experience. Consequently, Reserve decided to make its own truck.

The purchased tractor is powered by two 235-hp diesel engines, which means that the truck pulls 740 pounds per horsepower when loaded. Since there are 1.22 pounds payload, for every pound deadload, over 407 pounds of taconite are pulled per unit of rated horsepower.

Smooth power is obtained through two single-stage torque converters with integral charging pumps. The tractor has three foreward and one reverse speeds and full-time power steering.

Weighing 50,000 lb, the tractor is

HEAVY-DUTY CONSTRUCTION is necessary for hard, heavy, abrasive taconite.

# Specifications for 85-Ton Truck, Reserve Mining Co.

## Euclid Tractor

**Model No.:** 9FFD

**Engine:** Two GMC Series, two-cycle, 6-cylinder, Bore 4¼-in., Stroke 5 in., Each rated 235 hp @ 2100 rpm.

**Torque converters:** Two Allison Torqmatic single-stage converters with integral charging pump.

**Transmission:** Two Allison Torqmatic 600 Series transmissions with spur planetary gears, three forward and one reverse speeds.

**Steering:** Full-time power steering with Euclid booster.

**Brakes:** Two shoe internal expanding type—air-actuated power brake.

**Electrical system:** Six-volt lighting and air starting system.

**Tires and rims (tubeless):** Front—18:00 x 25—24 ply (2 tires) 13:00 rim size
Drive—18:00 x 25—24 ply (8 tires) 13:00 rim size

| | |
|---|---|
| **Service data:** Water cooling system | 30 gal |
| Fuel tank | 263 gal |
| Crankcase (each) | 32 qt |
| Transmission and converter (each) | 46 qt |
| Reservoir tank (hyd.) | 42 gal |
| **General dimensions:** Wheel base | 15 ft 0 in. |
| Cab-to-ground | 10 ft 11 in. |
| Chassis length | 27 ft 7½ in. |
| Over-all width | 12 ft 4½ in. |

**Tractor weight:** 50,000 lb

## 85-Ton Trailer

| | |
|---|---|
| **General dimensions:** Over-all length | 49 ft 6 in. |
| Over-all width | 15 ft 6 in. |
| Over-all height | 10 ft 2 in. |
| Loading height | 8 ft 2 in. |
| Ground clearance under frame | 0 ft 29 in. |

## Euclid Tractor and 85-Ton Trailer

| | |
|---|---|
| **General dimensions:** over-all length | 72 ft |
| **Capacities (trailer):** Struck | 75 tons (long) |
| Heaped | 85 tons (long) |
| **Weights:** Tractor | 50,000 lb |
| Trailer frame | 39,900 lb |
| Trailer box | 45,530 lb |
| Rear bogie, wheels and tires | 21,000 lb |
| Total trailer | 106,430 lb |
| Empty vehicle | 156,430 lb |
| Rated capacity | 191,400 lb |
| Gross vehicle | 347,830 lb |
| **18:00 x 25 tires:** Tractor—18:00 x 25—24 ply | 10 tires |
| Trailer—18:00 x 25—28 ply | 8 tires |

supported on ten 18:00 x 25, 24-ply tires. The cab is 10 ft 2 in. from the ground.

Although the eight tires Reserve put on its trailer are the same size as those on the tractor, they contain four more plies. The trailer body is constructed with high-strength steel and reinforced for taconite.

Actually, no equipment is manufactured specifically for taconite mining. Reserve simply takes the most rugged equipment available and adds to it. Since taconite has a hardness of 600 Brinell and weighs about 6075 lb per cu yd in place, an 8-ton drop of material that can pierce many steels results from each 5½-yd dipper load. Consequently this trailer has to be rugged.

Reserve's shift to the big taconite haulage unit is but one part of a general expansion and improvement in operations. As Reserve steadily increases capacity to over 9-million tpy pellets by 1963, so too will mining techniques and equipment improve. For example, seven of the final fourteen production shovels will carry 11-yd dippers. Currently two of these bigger shovels are in operation. For waste haulage, the 22-ton end-dump trucks will be replaced by 40-ton end-dump units equipped with 370-hp, twin-engine motors.

Reserve has simplified shovel-truck scheduling by plotting on a graph the number of trucks needed at various distances from the crusher. Thus, operations foremen can schedule equipment well in advance with very little rescheduling necessary after a particular operation gets under way. Having a set dumping point and uniform haul roads makes this simple procedure effective.

Reserve's main haul roads are ballasted with crushed stone, graded and sprinkled with water to lower truck maintenance, increase efficiencies and improve tire life.

## 50 Years to Mine

The Peter Mitchell Mine lies on a 9-mile by 2800-ft taconite deposit. The up-to 175-ft-thick deposit gives Reserve enough material to mine for the next 50 years at its planned production rate. Taconite is mined and chrushed to minus 4 in. at Babbitt and sent via a 47-mile railroad to a concentrator and pelletizer at Silver Bay on Lake Superior, where ore boats haul the pellets to steelmills. About three tons of 24.19% Fe magnetic taconite are necessary to produce one ton of 63.5% Fe pellets.

Reserve, jointly owned by Republic Steel Corp. and Armco Steel Corp, began producing pellets on Oct. 21, 1955. The initial 3¾-million tpy pellet capacity has since been expanded to about 6-million tpy and will reach over 9-million tpy by 1963.

Present taconite production amounts to about 54,000 tpd. The mining procedure consists of jet-piercing 9-in.-dia holes three feet below planned grade on 35-ft (average height) benches. The bottom four feet of the holes are chambered to about 12 in. The holes are then loaded with commercial and home-made slurries and AN/FO. Spacing is 21x21 ft or 22x22 ft, depending on the cut, or it can be less. About 20 rows are shot at a time, depending on the area. The holes are double-primed and variable delayed.

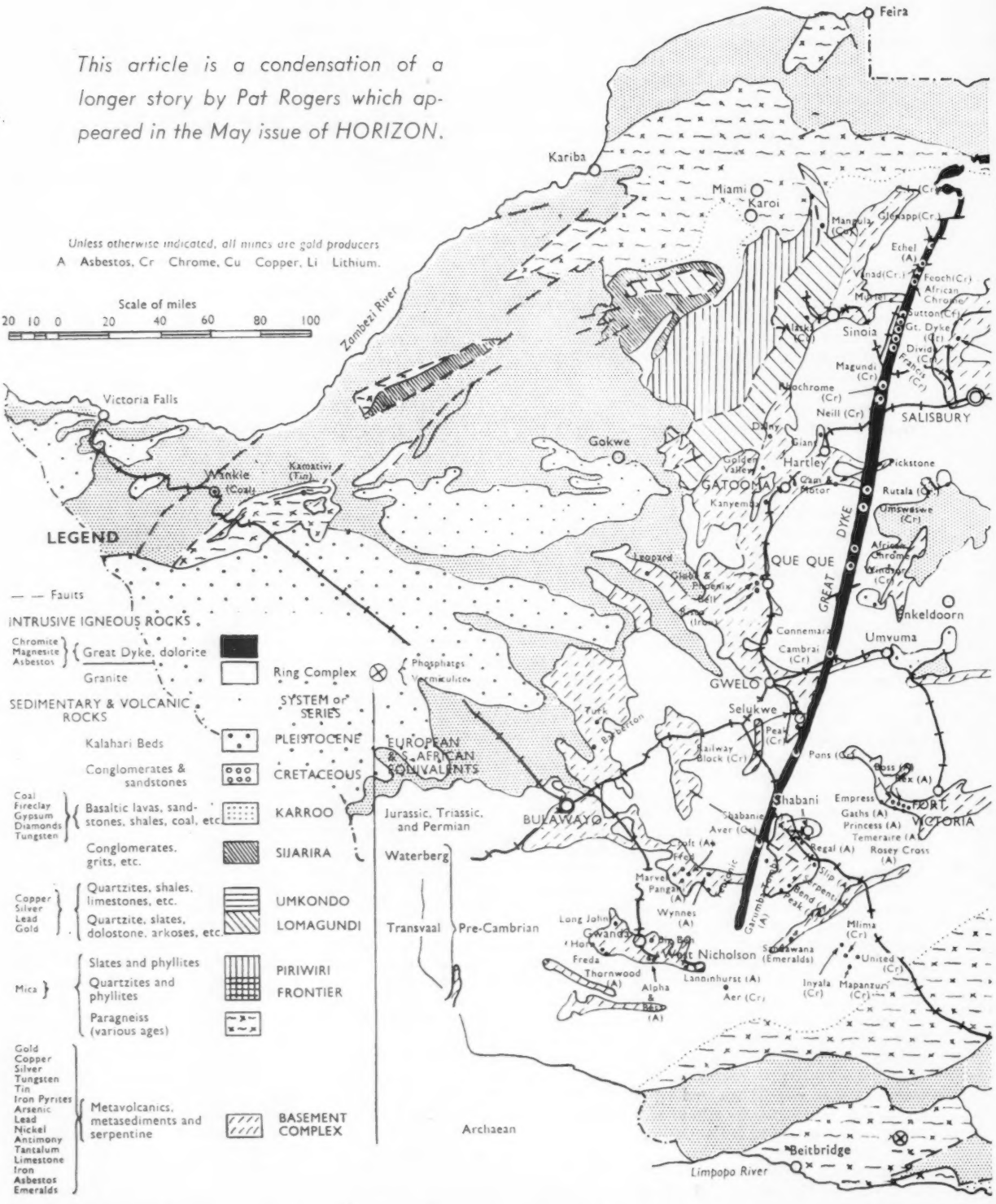
Six production shovels load the broken taconite into trucks for haulage to a 60-in. primary crusher. In 1963 Reserve plans to have two of these crushers located so as to minimize haul distances. Rubber-tired dozers clean up around the 5½-yd and 11-yd shovels.

At the primary crushing plant, an overhead push-button hoist tilts the side dump trailer bodies and the loads discharge into a 60-in crusher, powered by two 500-hp motors. Taconite is fed to three 30-in. secondary gyratories which reduce it to minus 4 in. A fourth stand-by gyratory is installed to prevent shut-downs for inspection and repair. The crushed rock is then transferred to 9800-ton capacity bins via a 1000 ft steel-cable-reinforced belt.

At Silver Bay, the taconite is crushed and ground to about 88% minus-325-mesh, the magnetic one-third extracted by magnetic separators and SiphonSizers, and the concentrate filtered. Concentrate is put back together again in the pelletizing plant.

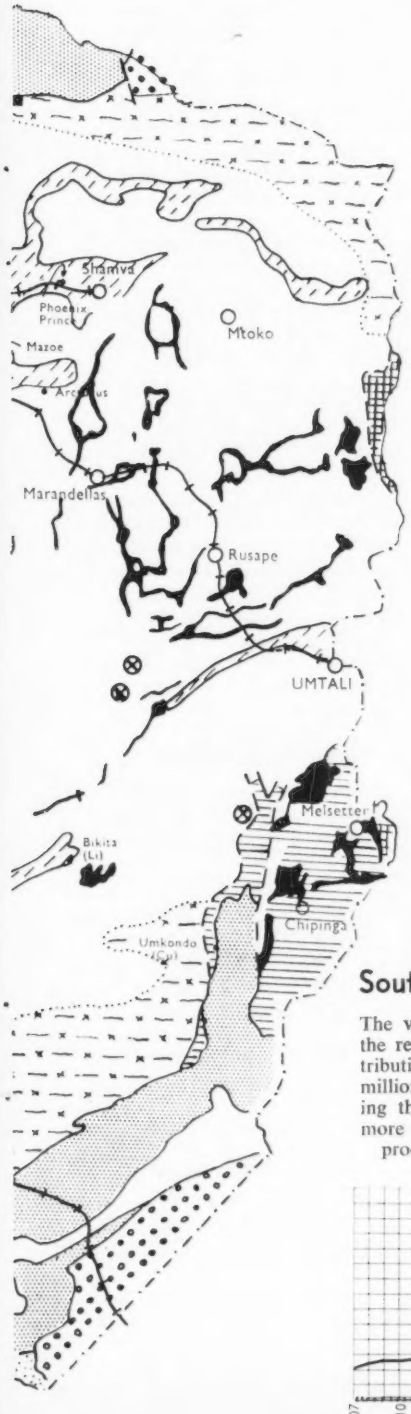
# Mining in Southern Rhodesia: With

*This article is a condensation of a longer story by Pat Rogers which appeared in the May issue of HORIZON.*




THE MAP PINPOINTS major producing areas, both past and present, that figure in Southern Rhodesia's mineral development.

# a Long Past Looking to a Bright Future




ALTHOUGH THE MINERAL OUTPUT value in Southern Rhodesia stands at little more than a fifth of that in Northern Rhodesia, the 1960 figure set a record for the British colony. And production should hit a new peak again this year.

Mining in Southern Rhodesia stretches back over 1000 years when, according to contemporary accounts from Arab traders, natives mined gold—perhaps 2-million oz from some 4000 pits—for trade with Persia, India and China. But the ancient industry went into eclipse, and it was only with the accidental re-discovery of an old working by an Englishman, Henry Hartley, in 1865, that Southern Rhodesia's mineral output, placed at nearly $75-million for 1960, began again.

The central feature of mineral distribution in Southern Rhodesia is the Great Dike, which appears as a range of hills stretching north and south for 350 miles through the middle of the British colony. Within the dike are vast reserves of high-grade chrome. Along either side, like islands in a sea of granite, are the gold belts. Richer on the west side, they extend in less regular form on the east as far as Umtali. In the lower lying areas, on the boundaries of Southern Rhodesia, are the coalfields.

Asbestos and chrome are associated with the Great Dike, but the other base minerals are widely scattered. North of Sinoia are the rich copper and mica fields; east of Fort Victoria, lithium and phosphate deposits; tin lies southeast of Wankie; and there is extensive iron ore near Que Que and in the Bukwe Mountains.

Two things helped establish the mining industry on a firm footing. The first was the extension of railway communications: in 1897 the railway reached Bulawayo from the south, to be connected five years later with the Beira-Salisbury line, opened in 1899. The other factor was the realization that Rhodesian development —unlike South Africa's Rand—needed the "smallworker," not the big combines. Mining terms were accordingly altered in 1903 to ease conditions for the smallworker, who might be the individual prospector or in a small partnership, perhaps mining property leased from a large firm. Able to operate deposits too small or too low in value to interest companies, the smallworker has treated vast quantities of ore which would otherwise never have been touched.

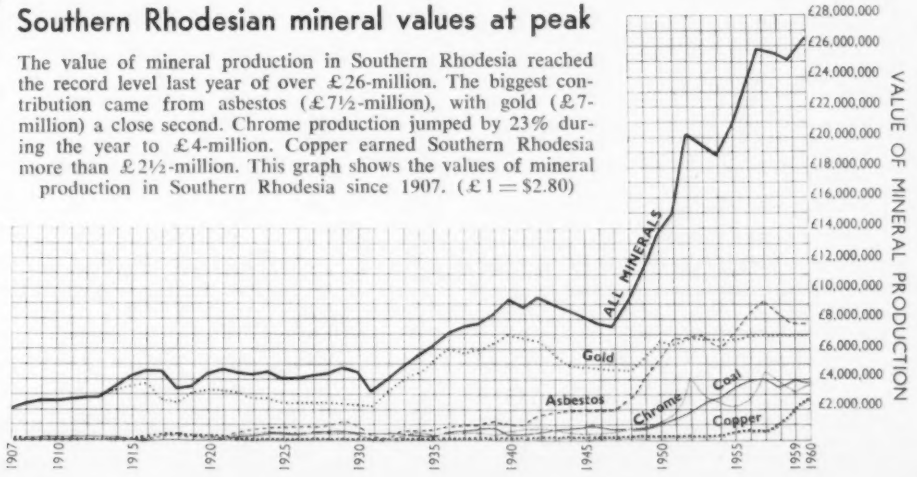
In the early years of the colony, gold production received nearly all the emphasis, but prospectors found economic deposits of other minerals. Limited production from the Wankie coalfield began ten years after its discovery in 1894, following the extension of the railway to Victoria Falls and expanded as demand increased. About the same time, the first base metal outputs began to come from the lead concentrates at Umtali. Chrome production started in 1905, six years after the first copper claims near Fort Victoria were registered, and tungsten workings opened up a year later. To these, new discoveries added asbestos from the Belingwe district in 1908.

With this great diversity and the

*(Continued on p 90)*

## Southern Rhodesian mineral values at peak

The value of mineral production in Southern Rhodesia reached the record level last year of over £26-million. The biggest contribution came from asbestos (£7½-million), with gold (£7-million) a close second. Chrome production jumped by 23% during the year to £4-million. Copper earned Southern Rhodesia more than £2½-million. This graph shows the values of mineral production in Southern Rhodesia since 1907. (£1 = $2.80)



# Conveyor Belt Horsepower and Operating Distances Continue to Increase

E. R. TRAXLER

*Last June, on pp 219 and 220, the author discussed four ways to reduce conveyor costs. The accompanying tables outline some specific installations which are rated as the world's largest; one listing on the basis of horsepower and the other on length.*

During the past 10 to 15 yrs, belt conveyors have grown steadily in size; hp of drives has increased, and belting material and construction have been improved to give higher strengths and longer life.

For each installation in both listings, the following components are described:

**Belt Carcass Materials**—28 units use rayon fiber for longitudinal strength, 22 use steel cable, and seven use cotton. In all cases where cotton was used, and on most of the rayon belts, nylon fiber was woven transversely into the fabric.

**Loading Rates and Belt Speeds**—highest U.S. rate, at least for 100-lb material, is on the stacker units of wheel excavators where 54-in. belting may handle up to 6200 tph with 1000 fpm belt speeds. In German coal fields, 87-in. belting at speeds of 900 to 1100 fpm carry up to 15,000 tph of overburden.

**Terminal Pulley Centers** — Loading rate and amount of lift have more to do with requiring horsepower than does the center distance. (see E&MJ, June 1961, p 220).

Two of the units listed in the "long center" tabulation are installed with 180° twists in the return run at each end of the conveyor. In the past 10 yrs, a number of turnover installations have been made, and these have been proven beneficial in that:

1. With the clean or bottom side of belt against the return idlers, sticky or frozen material does not build up on the return idler rolls.

2. With the clean side against the return idlers, idler roll surface wear is reduced.

3. The need for decking between the carrying and return belt strands is lessened. Material falling on the return belt strand can be automatically dumped where belt starts through the twist.

4. Belt top cover wear caused by gritty surface against return idlers is eliminated.

**Conveyor Belt Drives** — Installation No. 34 has a single pulley drive and a 1250-hp motor and reducer. Installation No. 3 has a 600-hp conveyor drive using a 300-hp motor and reducer coupled to each end of a single drive pulley shaft. The use of dual-motor two-pulley drives provides further division of motors. For instance, No. 7 is a 600-hp drive with a 200-hp motor and reducer coupled to each end of primary drive pulley shaft and one 200-hp motor and reducer coupled to the secondary drive pulley shaft. The German overland units carry the motor standardization idea to the ultimate. In Nos. 22, 23, 37, 38, 39, 40, and 41, the head end drives are usually designed with two pulleys. Two motor and gear sets can be coupled to each pulley. The tail pulley may also be a third drive pulley to which one or two motor and gear sets may be coupled. This permits standardized drives to which as many as six motors may be coupled, deending on the loading rate, center distance, and lift. The German troughing idlers that are mentioned are usually the 30° angle type and some of the return idlers are made with 10° troughing angle.

## Belt Conveyors (World-Wide) with Terminal Pulley Centers at 4000 ft or Over

| Installation | Belt Width, In. | Type Conveyor Belt | Approx. Operating Tension Lb. per In. | Loading Rate TPH, (2000 lb.) | Material Transported | Belt Speed FPM | Lift (+) or Drop (−) Ft. | Installed Motor HP | Terminal Pulley Centers Ft. |
|---|---|---|---|---|---|---|---|---|---|
| 1. Part of 1½-mile overland system handling crushed coal. Return belt twisted 180°—"clean" side always against the return idlers. This improves wet and winter operation. In service about three yr. | 36 | Rayon Fabric | 250 | 800 | Coal | 600 | 26 − | 150 | 4340 |
| 2. Units handle overburden or lignite in German strip mine. | 48 | Probably Steel Cable | — | 3000 | Overburden | 790 | 139 + | 855 | 4420 |
| 3. Units handle overburden or lignite in German strip mine. | 87 | Steel Cable | 1630 | 15000 | Overburden | 885 | 59 + | 4000 | 4590 |
| 4. Part of three-mile overland system to be in service for coal mine this year. Return belt twisted 180°. | 42 | Cotton-Nylon | 295 | 1000 | Coal | 583 | 19 + | 250 | 4660 |
| 5. Part of 5½-mile overland system. Conveys limestone from quarry to cement plant. Working since 1959. | 36 | Rayon-Nylon Fabric | 573 | 1000 | Limestone | 500 | 81 + | 250 | 4700 |
| 6. Conveys iron ore in a mining operation. | 36 | Rayon Fabric | 535 | 1250 | Iron Ore | 600 | 15 + | 400 | 4800 |
| 7. Representative of "Mother" or main line belt units used in U. S. underground coal mining operations. | 42 | Various Types | 200 to 300 | 800 to 1000 | Coal | 600 | Undulating | 200 to 300 | to 5000 |
| 8. Handles overburden or lignite in German strip mining. | 71 | Probably Steel Cable | — | 9900 | Overburden | 885 | Undulating | 2725 | 5410 |
| 9. Handles coke in a steel mill. | 48 | Rayon Fabric | 420 | 500 | Coke | 300 | 19 + | 150 | 5510 |
| 10. Handles coal at a French mine. | 31 | Steel Cable | — | 250 | Coal | 400 | 125 + | 130 | 5900 |
| 11. "Mother" or main line belts in English coal mines. | 30–42 | Various Types | — | — | Coal | — | Undulating | 120 | to 6000 |
| 12. Handles overburden or lignite in German strip mining. | 48 | Probably Steel Cable | — | 3000 | Overburden | 790 | Undulating | 855 | 6700 |
| 13. Handles iron ore at French mine. | 31 | Steel Cable | 1730 | 500 | Iron Ore | 500 | 518 + | 800 | 7620 |
| 14. Once conveyed coal at a mine which has since closed. | 30 | Steel Cable | 715 | 300 | Coal | 300 | 136 − | 200 | 10900 |
| 15. Part of 5½-mile overland system. Conveys limestone from quarry to cement plant. Worked since 1959. | 36 | Rayon-Nylon Fabric | 640 | 1000 | Limestone | 500 | 155 − | 300 | 11800 |
| 16. Cable Belt, Ltd., Australia, design where two steel cables carry the entire tensile load and the material is conveyed on a belt-like apron suspended between the two cables. | 42 | Suspended Between 2 Steel Cables | — | 560 | Coal | — | 680 + | 900 | 12500 |

# Belt Conveyor Units (World-Wide) with Drive Motor of 600 hp or Over

| Installation | Belt Width, In. | Type Conveyor Belt | Approx. Operating Tension Lb. per In. | Loading Rate TPH, (2000 lb.) | Material Transported | Belt Speed FPM | Terminal Pulley Centers, Ft. | Lift (+) or Drop (−) Ft. | Installed Motor HP |
|---|---|---|---|---|---|---|---|---|---|
| 1. Dual pulley type; 400 hp at primary and 200 at secondary. Handling crushed coal for 14 yr. | 60 | Cotton Cord | 500 | 2800 | Coal | 600 | 503 | 136+ | 600 |
| 2. Dual pulley; 400 and 200 hp. Handling ROM coal from rotary car dump (underground) for 14 yr. | 60 | Rayon Fabric | 600 | 2800 | Coal | 600 | 757 | 171+ | 600 |
| 3. Single pulley; 300-hp motor at each end of pulley shaft. Handling copper ore since 1960. | 42 | Rayon-Nylon Fabric | 1050 | 1650 | Copper Ore | 460 | 2077 | 199+ | 600 |
| 4. Single motor type. Twin conveyor units unloading iron ore from ships and transferring to RR cars. | 48 | Steel Cable | 850 | 3600-4300 | Iron Ore | 600 | 1130 | 85+ | 600 |
| 5. Slope conveyor handling ROM coal from underground dump for about 10 yr. | 48 | Steel Cable | 915 | 1200 | Coal | 560 | 1700 | 490+ | 600 |
| 6. Dual pulley; 300-hp motor and reducer to primary pulley and another to secondary. Handling copper ore. | 48 | Rayon-Nylon Fabric | 1150 | 2100 | Copper Ore | 600 | 1037 | 203+ | 600 |
| 7. Dual pulley; 200-hp motor and reducer at each end of primary drive shaft and 200-hp unit at secondary. | 54 | Rayon-Nylon Fabric | 750 | 3300 | Iron Ore | 550 | 648 | 173+ | 600 |
| 8. Twin units handling iron ore. | 60 | Rayon Fabric | 603 | 5000 | Iron Ore | 600 | 460 | 96+ | 675 |
| 9. Single pulley type; 350-hp motor and reducer at each end of pulley shaft. Used in slope tunnel. | 36 | Rayon Nylon Fabric | 1700 | 700 | Iron Ore | 460 | 3700 | 793+ | 700 |
| 10. Dual pulley type; two 250-hp motors at primary pulley and 200-hp unit at secondary. Conveys iron ore to stockpile and can be reversed. | 60 | Rayon Cord | 763 | 6000 | Iron Ore | 500 | 1260 | 54+ | 700 |
| 11. Same as 10. Reclaiming operation pulley is mounted so that gravity take-up is between it and main drive. | 60 | Rayon Cord | 779 | 6000 | Iron Ore | 500 | 2060 | 27+ | 700 |
| 12. Same as 10. Reclaiming operation pulley is mounted so that gravity take-up is between it and main drive. | 60 | Rayon-Nylon Fabric | 800 | 6200 | Iron Ore | 500 | 1900 | 27+ | 700 |
| 13. A 54-in. unit which is the stacker boom on a wheel-type excavator. | 54 | Rayon-Nylon Fabric | 565 | 5450 | Over-burden | 1000 | 283 | 74+ | 750 |
| 14. Two conveyors which handle copper ore in an underground mining operation and were installed about seven yrs ago. | 54 | Rayon-Nylon Fabric | 973 | 2200 | Copper Ore | 480 | 1600 | 212+ | 750 |
| 15. Two conveyors which handle copper ore in an underground mining operation and were installed about seven yrs ago. | 54 | Rayon-Nylon Fabric | 893 | 2200 | Copper Ore | 480 | 1732 | 195+ | 750 |
| 16. Twin units handling taconite in an iron ore pelletizing plant—operating approximately four yr. | 60 | Rayon Fabric | 660 | 5000 | Iron Ore | 550 | 419 | 91+ | 750 |
| 17. Stacker conveyors (60-in. units) with similar speed and capacities on three wheel-type excavators. | 60 | Rayon-Nylon Fabric | to 525 | to 5000 | Over-burden | to 1200 | to 300 | to 80+ | to 800 |
| 18. Dual pulley type; 600-hp motor and reducer at primary pulley and 250-hp unit at the secondary. | 54 | Steel Cable | 1060 | 5400 | Iron Ore | 500 | 1575 | 89+ | 850 |
| 19. Conveys iron ore in a French operation. | 31 | Steel Cable | 1730 | 500 | Iron Ore | 500 | 7620 | 518+ | 800 |
| 20. Copper ore is conveyed up a slope from an underground operation. | 42 | Steel Cable | 1500 | 850 | Copper Ore | 450 | 2143 | 680+ | 800 |
| 21. Dual pulley type; two 300-hp motors coupled to primary pulley and 250-hp unit coupled to secondary. | 60 | Cotton-Nylon Fabric | 885 | 6000 | Iron Ore | 500 | 361 | 106+ | 850 |
| 22. Dual pulley type; two 285-hp motors at primary and a 285-hp motor at secondary. Conveys overburden and lignite. | 48 | Probably Steel Cable | — | 3000 | Over-burden | 790 | 4420 | 139+ | 855 |
| 23. Dual pulley type; two 285-hp motors at primary and a 285-hp motor at secondary. Conveys overburden and lignite. | 48 | Probably Steel Cable | — | 3000 | Over-burden | 790 | 6700 | 103+ | 855 |
| 24. Single pulley type. Conveys iron ore from the stockpile at a mine. | 60 | Rayon-Nylon Fabric | 1060 | 6720 | Iron Ore | 600 | 975 | 72+ | 875 |
| 25. Twin units at taconite operation. Have been in service for about four yr. | 60 | Cotton-Nylon Fabric | 780 | 5000 | Iron Ore | 550 | 681 | 110+ | 900 |
| 26. Twin units at taconite operation. | 60 | Cotton-Nylon Fabric | 900 | 5000 | Iron Ore | 550 | 706 | 123+ | 900 |
| 27. Cable Belt, Ltd. design—two steel cables carry entire tensile load and material carried on belt-like apron hung between the cables. | 42 | Suspended Between 2 Steel Cables | — | 560 | Coal | — | 12500 | 680+ | 900 |
| 28. Dual pulley type; two 300-hp motors and reducers at each end of primary shaft and a 300-hp unit at secondary. | 60 | Rayon Cord | 1055 | 3210 | Copper Ore | 465 | 757 | 202+ | 900 |
| 29. Slope unit taking ore to surface from underground coal mine. | 42 | Steel Cable | 1675 | 1000 | Coal | 575 | 2500 | 715+ | 900 |
| 30. Conveys iron ore at steel mill. | 60 | Rayon-Nylon Fabric | 1150 | 6200 | Iron Ore | 500 | 1800 | 70+ | 950 |
| 31. A 54-in. unit which is the stacker on a wheel-type excavator. | 54 | Rayon-Nylon Fabric | 650 | 6200 | Over-burden | 1000 | 327 | 85+ | 1000 |
| 32. Conveyor in France. | 55 | Probably Steel Cable | 1260 | 2880 | Grit | 600 | 892 | 206+ | 1200 |
| 33. Handles taconite at iron ore pelletizing plant. Has been operating for about four yr. | 60 | Steel Cable | 1960 | 3360 | Iron Ore | 400 | 1000 | 277+ | 1200 |
| 34. Single pulley type using one motor. Conveys iron ore from primary crusher at a mine. | 60 | Rayon-Nylon Fabric | 1350 | 6720 | Iron Ore | 600 | 482 | 130+ | 1250 |
| 35. Single pulley drive with one 1500-hp motor. Conveys coal up slope from underground operation. | 42 | Steel Cable | 2250 | 1200 | Coal | 625 | 3290 | 862+ | 1500 |
| 36. Conveys coal up slope from underground mine. | 48 | Steel Cable | 2260 | to 1700 | Coal | 625 | 3087 | 807+ | 1600 |
| 37. Handles overburden in German strip mining operation. | 87 | Probably Steel Cable | — | 15500 | Over-burden | 1100 | 3740 | — | 1635 |
| 38. Four 545-hp motors coupled to two drive pulleys to furnish required hp. Handles lignite at German mine. | 87 | Probably Steel Cable | — | 7000 | Lignite | 1020 | 1120 | 190+ | 2180 |
| 39. Five 545-hp motors used for the drive with four at a dual pulley head drive and one at the tail pulley. Handles overburden at a German mine. | 71 | Probably Steel Cable | — | 9900 | Over-burden | 885 | 5410 | 44+ | 2725 |
| 40. Five 545-hp motors used for the drive with four at a dual pulley head drive and one at the tail pulley. Handles overburden at a German mine. | 71 | Probably Steel Cable | — | 9900 | Over-burden | 885 | 5410 | 149+ | 2725 |
| 41. Handles overburden at a German operation. | 87 | Steel Cable | 1630 | 15000 | Over-burden | 885 | 4590 | 59+ | 4000 |

# How to Determine Ventilation Required for Mine Enclosures

W. A. VINE

THE USE OF EXPLOSIVES in confined enclosures such as underground mines requires the introduction of pure air to dilute poisonous gases produced by decomposition of the explosives.

Table I shows the amount of poisonous gases that may be liberated by detonation of some common explosives. It has been compiled from various sources[1,2] and certain modifications have been made in the selection of explosives and in rounding figures.

Maximum allowable limit for 8-hr exposure has been established as 100 parts per million (ppm) for CO and only 5 ppm for $NO_2$ by the Conference of Governmental Hygienists in 1954. This article shows how to determine the minimum ventilation requirements for a working place where explosives are used in conformance with minimum safety standards.

Mr. Vine is professor of mining at the Montana School of Mines, Butte, Montana.

## Sample Calculation

Let x be the number of cu ft of poisonous gas in any air volume at time, t. In an example, assume a 7x9-ft drift, 100 ft long and approximately 6000 cu ft in volume, and that the face is blasted with 30 holes each containing 6.4 lb of explosive. The total blast will therefore require 200 lb of explosive, and if the explosive liberates 0.4 cu ft of CO per lb, 80 cu ft of CO will be produced by the blast. Specifications call for the air to contain no more than 100 ppm of CO, and since the volume of the evacuation is 6000 cu ft, the allowable volume of CO is (100/1,000,000)x6000 cu ft, or 0.6 cu ft.

If it is assumed that 3000 cu ft of pure air is introduced into the working place each minute, the problem is to determine how long the ventilation current must be allowed to flow to make the place safe for entry.

Since there will be an equal amount of air entering the place, and vitiated air leaving the place, it is assumed that perfect mixing of the air will take place. Then the absolute volume of poisonous gas will be expelled from the working place at a continually decreasing rate of time. Expressed as an equation,

$$\frac{dx}{dt} = -nx$$

Thus the rate of change of contained gas in relation to time decreases in proportion to the amount of gas present. The proportionality constant, n, is dependent upon the number of changes of air per unit of time.

By separation of variables, the equation is solved:

$$\frac{dx}{x} = -n\,dt$$

and integrating:

$$\text{Log}_e x = -nt + C$$

To evaluate C, the constant of integration, assume that $x = P$, when $t = 0$. If P equals the number of cu ft of poisonous gas liberated,

$$\text{Log}_e x = -nt + \text{Log}_e P, \text{ or}$$
$$\text{Log}_e x = \text{Log}_e P - nt$$

This equation appears in graphic form in Fig. 1. From the figure, the volume of gas present in the enclosure is determined by the sloping line; at time 0, the volume of poisonous gas is 80 cu ft, and the time necessary for the gas to reach its allowable limit of 0.6 cu ft is slightly less than 10 min.

Fig. 1 is for the special case of one ventilation rate and one volume of gas liberated. Each difference in any of the variables would require a new graph for the solution of the equation.

When the equation is simplified:

$$\text{Log}_e \frac{P}{x} = nt$$

and when P/x is replaced by Y, a standard nomogram can be constructed:

$$\text{Log}_e Y = nt$$

In this instance,

$$Y = \frac{\text{(lb explosive) (vol gas per lb explosive)}}{\left[\dfrac{\text{safe limit gas ppm}}{1{,}000{,}000}\right]\ \text{(vol enclosure cu ft)}}$$

$$n = \frac{\text{(ventilation rate cfm)}}{\text{(vol of enclosure cu ft)}}$$

$t$ = time

The nomogram in Fig. 2, by which the equation may be solved, can be used in two ways: (1) If it is desired to determine the time necessary to ventilate a place when the volume of evacuation, volume of gas liberated, and safe standard of contained gas are known, it is only necessary to determine Y and n, connect the two values with a straight line and read the value representing the time from the horizontal scale where the straight

## Table I. Quantities of Poisonous Gases That May Be Liberated by Detonation of Explosives.

| Explosives | CO (cu. ft./lb.) | $NO_2$ (cu. ft./lb.) | Remarks |
|---|---|---|---|
| **Slurries** | | | |
| 30% TNT, 55% AN, 15% $H_2O$ | 0.39 | | (in cu. ft. gas per cartridge, 1¼ x 8) All charges confined in borehole |
| 25% TNT, 60% AN, 15% $H_2O$ | 0.21 | | |
| 20% TNT, 65% AN, 15% $H_2O$ | 0.12 | | |
| 30% TNT, 28% AN, 15% $H_2O$, 27% SN | 0.29 | | |
| **Ammonium Nitrate Explosives** | | | |
| 97% AN, 3% Inert, 0% FO | 0.35 | 0.28 | Initiated with 35 gm. tetryl |
| 96% AN, 3% Inert, 1% FO | 0.35 | 0.39 | |
| 95% AN, 3% Inert, 2% FO | 0.34 | 0.21 | |
| 93% AN, 3% Inert, 4% FO | 0.40 | 0.17 | |
| 91% AN, 3% Inert, 6% FO | 0.48 | 0.04 | |
| 91% AN, 3% Inert, 6% FO | 0.10 | 0.30 | Initiated with special EBC |
| 91% AN, 3% Inert, 6% FO | 0.16 | 0.04 | Initiated with 10 gm. tetryl |
| 90% AN, 3% Inert, 7% FO | 0.88 | 0.01 | Initiated with 35 gm. tetryl |
| 90% AN, 3% Inert, 7% FO | 0.48 | 0.10 | Initiated with 35 gm. blasting gelatin |
| 100% AN, | 0.29 | 0.31 | Initiated with 35 gm. tetryl |
| 98% AN 2% FO | 0.26 | 0.27 | |
| 96% AN 4% FO | 0.38 | 0.19 | |
| 96% AN 4% FO (w/$H_2O$) | 0.43 | 0.13 | |
| 94% AN 6% FO | 0.45 | 0.03 | |
| 94% AN 6% FO (w/$H_2O$) | 0.59 | 0.08 | |
| 83% AN 7% FO 10% $H_2O$ | 1.36 | 0.00 | |
| 91% AN 9% FO | 1.28 | 0.00 | |
| **Commercial Explosives** | | | |
| Tetryl, $C_7H_5O_8N_5$ | 5.40 | 0.00 | Initiated with No. 8 EBC |
| Semi-gelatin dynamite | 0.65 | 0.00 | Initiated with 35 gm. tetryl |
| **U. S. Bur. Mines Permissibles** | "Poisonous gases" cu. ft./lb | | |
| Fume class A | to 1.25 | | |
| B | to. 2.50 | | |
| C | to 3.72 | | |

line crosses. (2) Where the value of Y is known, and the volume of the enclosure must be also be known, the ventilation rate may be determined if a time requirement to ventilate a place has been established.

Connecting the Y-value and scale value for t with a straight line that intersects the n-scale, the straight line will intersect the n-scale at the proper number of changes of air per minute required to dilute the volume of the air contained in the enclosure to the required analysis.

Fig. 2 shows how to solve a problem where

$$Y = 1{,}000{,}000 \times \frac{(200 \text{ lb explosive})\ (0.4 \text{ cu ft CO per lb})}{(100 \text{ ppm CO allowable})\ (6000 \text{ cu ft vol})}$$

$$n = \frac{(3000 \text{ cfm ventilation rate})}{(6000 \text{ cu ft vol})}$$

$$= 0.5 \text{ changes of air per min}$$

If the point Y = 133 is connected with the point n = 0.5, the straight line will intersect the scale at point t = 9+ minutes.

The chart must be used with judgement. As with most theoretical analyses, certain underlying assumptions must be made before an answer can be obtained. The conditions assumed to complete the problem might, or might not, be valid for practical applications. The weakest point in this solution is, of course, the assumption that the ventilating air must be perfectly mixed with the vitiated air in the enclosure at all times. Only for cases where exchange of air is rather rapid and causes turbulence in the enclosure will this assumption approach being true.

A second precaution to observe is the precision with which the volume of poisonous gas may be determined, and the correspondence of volume of the gas formed in practice with the volume of gas formed under normal conditions. The volumes of the different gases which are products of the explosive reaction differ under different conditions of oxygen balance, confinement and strength of initiation. A tabular value has been obtained from a controlled experiment. But will conditions in actual practice be duplicated so that there is a certainty that the engineer can predict the actual volume of the poisonous gas? Under the present state of knowledge as to the volume of formation of the various gases under all varieties of field conditions, and knowing, as we do, the limitations of our knowledge about the mechanics of mixing under all conditions, it is suggested that when the chart is used, it should serve as a guide only, and that an adequate safety factor be applied to the calculated answer.

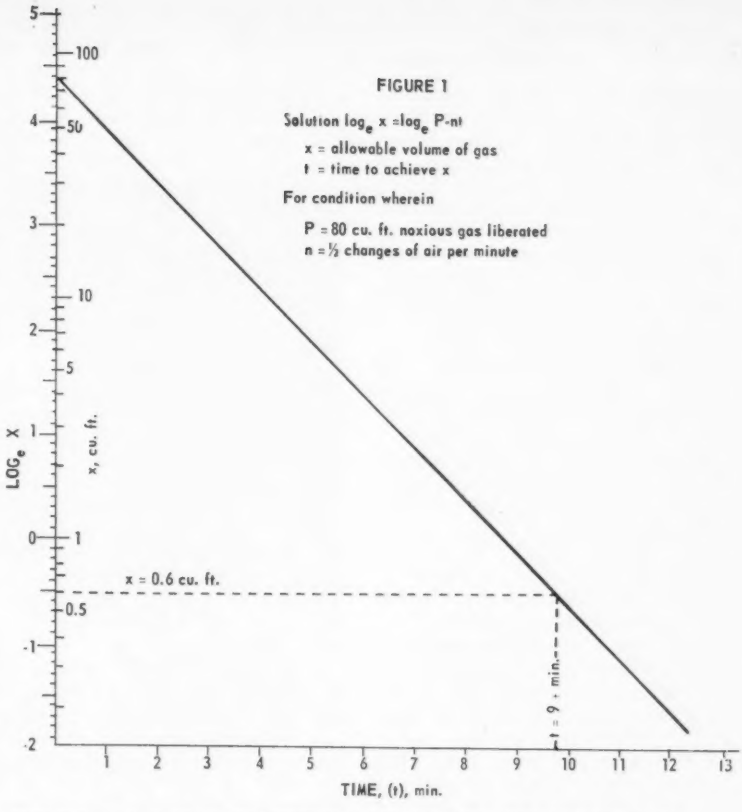
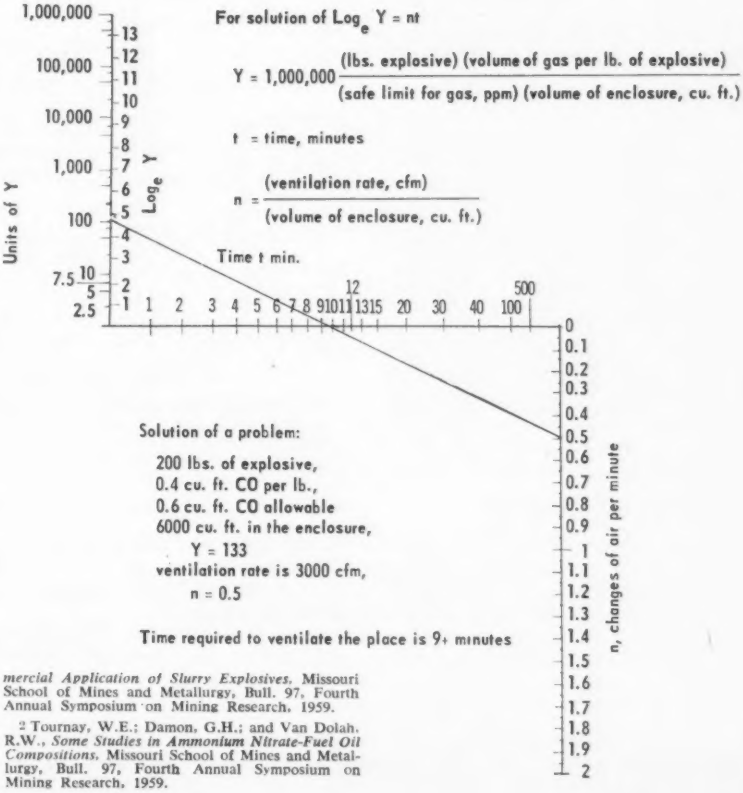


FIGURE 1
Solution $\log_e x = \log_e P - nt$
x = allowable volume of gas
t = time to achieve x
For condition wherein
P = 80 cu. ft. noxious gas liberated
n = ½ changes of air per minute
$LOG_e$ x
x, cu. ft.
x = 0.6 cu. ft.
t = 9 + min.
TIME, (t), min.

FIGURE 2 – – NOMOGRAM TO DETERMINE MINIMUM VENTILATION REQUIREMENTS


For solution of $Log_e Y = nt$
$Y = 1{,}000{,}000 \frac{\text{(lbs. explosive) (volume of gas per lb. of explosive)}}{\text{(safe limit for gas, ppm) (volume of enclosure, cu. ft.)}}$
t = time, minutes
$n = \frac{\text{(ventilation rate, cfm)}}{\text{(volume of enclosure, cu. ft.)}}$
Time t min.
Units of Y
$Log_e$ Y
n, changes of air per minute
Solution of a problem:
200 lbs. of explosive,
0.4 cu. ft. CO per lb.,
0.6 cu. ft. CO allowable
6000 cu. ft. in the enclosure,
Y = 133
ventilation rate is 3000 cfm,
n = 0.5
Time required to ventilate the place is 9+ minutes

[1] Dixon, John F.C., *Development of Physical Properties and Techniques Suitable for Commercial Application of Slurry Explosives*, Missouri School of Mines and Metallurgy, Bull. 97, Fourth Annual Symposium on Mining Research, 1959.

[2] Tournay, W.E.; Damon, G.H.; and Van Dolah, R.W., *Some Studies in Ammonium Nitrate-Fuel Oil Compositions*, Missouri School of Mines and Metallurgy, Bull. 97, Fourth Annual Symposium on Mining Research, 1959.

## Southern Rhodesia

*(Continued from p85)*

increasing industrial importance of such finds, gold has lost its dominance as Southern Rhodesia's most valued mineral and now stands second to asbestos in the colony's 1960 mining income. But gold production has accounted for slightly more than half of the total mineral value since the industry began a century ago, and there are about 265 working mines today, with the bulk of production accounted for by a dozen major ones. By far the largest of these is one of the oldest, the Cam and Motor near Gatooma, which at 6500 ft also has the distinction of being the deepest mine in the Rhodesian Federation. Southern Rhodesia ranks seventh among the Free World's gold producers.

The British colony is also the world's leading miner of the better grades of asbestos and is third in total output, confined to the principal commercial form, chrysotile asbestos fiber. Although there is some domestic consumption, approximately 95% is exported—to Britain and about 20 other countries—so that the industry is geared to world market conditions. The average price for Rhodesian asbestos is about $157 per ton, but it varies according to grade from about $50 to over $800 per ton. The major producing property is the Shabenie mine at Shabeni, which, although the oldest, shows no sign of exhaustion.

Although there are many coal deposits in Southern Rhodesia, the only one being worked is at Wankie, where the mining area ranks among the largest in the world, supplying the requirements of the colony and adjoining territories. Production capacity is 5-million tons per year, which could keep the 60 sq mi of coalfield busy for the next 100 years. The pithead price for this output, until next October, stands at $2.80 per ton.

Chrome sells for about nine or ten times this and makes up a good part of the mining income, since Rhodesia has for some years retained a place as one of the world's leading suppliers. A deficiency in rail haulage capacity, which limited production in the past, was overcome four years ago, but world market conditions have kept output below top capacity, which exceeds the present 600,000 tons a year.

Until recently, copper mining was on too small a scale to be profitable. However, with production valued at over $7-million for 1960, this metal has risen to an easy fifth place in the table of mineral values. Two mines are now in operation: the Umkondo, near Fort Victoria, and Mangula, near Sinoia. They were opened in 1955 and 1957 respectively, and a smelting and fire-refining plant went onstream last year at Alaska.

Recent negotiations with the Southern Rhodesian Government on the establishment of a pig iron project in the southeast corner of the country have been officially announced by Mines Minister C. J. Hatty. Rhodesian Iron & Steel Corp., owned by a consortium of Lancashire Steel Co. of Britain and the Rhodesian copper mining groups, will handle the project. It will develop iron-ore deposits at Bukwa and use furnace installations on the Bubye coalfield near Beit Bridge on the Rhodesian-South African border.

Aside from these important minerals, Southern Rhodesia is the world's largest supplier of non-crystalline corundum and produces as well, large amounts of antimony, nickel, quartz, manganese and columbium. All told, some 30 base minerals, including beryl, lithium and tantalite, come out of Southern Rhodesia's mines. As a result of such activity, the mining industry forms, with tobacco, one of the country's two main financial pillars, employing about 2800 Europeans and 51,150 Africans. And in addition to its contribution to exports, mining generates many other domestic activities, such as metal manufacturing, Southern Rhodesia's biggest secondary industry.

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## Western Iron *(Continued from p71)*

### CALIFORNIA

**14. Shasta County**

The Iron Exploration Co., a joint venture of Bunker Hill Mining, W. R. Grace & Co., Morrison & Knudsen and Hydrocarbon Research, is now in the midst of a comprehensive investigation of ore potential in the Shasta Iron deposits near Redding.

### ALASKA

To the north—Alaska and British Columbia—exploration continues to outstrip production, which has barely scratched potential ore reserves.

U. S. Steel and Mt. Andrew Mining Co. are probing ore deposits in two widely separated places, one just west of Skagway and the other, some 300 miles southeast of the first, on the eastern side of Prince of Wales Island.

### BRITISH COLUMBIA

Total iron ore production for the past decade has grown to 6.6-million tons, valued at around $50-million. Last year's output alone took in some $11-million on the open market, and by 1964 mine operators expect an annual income of $25-million. Aside from the pits now being worked for ore, various other deposits still remain untouched in the interior and along the coast. Here is a brief run-down of present developments:

**17. Texada Mines**—located on Texada Island, producing 600,000 tons a year. Mitsubishi has signed for purchase of 1.4-million tons of iron concentrates.

**18. Empire Development Co.**—located on Vancouver Island, producing 400,000 tons a year. Takahashi Ltd. will buy 400,000 tons of concentrate from Empire.

**19. Nimpkish Iron Mines**—located on Vancouver, near Empire, producing 300,000 tons a year. Takahashi will buy another 400,000 tons of concentrate here.

**20. Kennedy Lake Mines**—on Vancouver and owned by Noranda Mines. Capacity: 700,000 tons a year. Noranda has a 5-million-ton concentrate contract with Mitsubishi.

**21. Jedway Iron Mines**—on the Queen Charlotte Islands. Capacity: 400,000 tons a year. Sumitomo will buy 2-million tons of concentrates.

**22. International Iron Mines**—at Zeballos, on Vancouver. Capacity: 500,000 tons a year. International has a 500,-000-ton concentrate contract with Takahashi.

**23. Bugaboo Iron** near Ft. Renfrew on Vancouver and owned by International Iron Mines. Estimated reserves: over 5-million tons.

**24. Iron River** deposits on Vancouver's Campbell River and owned by Western Ferric Ores. Estimated reserves: 600,000 tons.

**25. Tasu Harbor deposit** on the Queen Charlotte's and owned by Ventures. Estimated reserves: 6-million tons with an additional 1-million tons of copper ore, making the property one of the largest on the coast.

**26. Weeden River** property near Kitimat, on the mainland east of the Charlotte's, and also owned by Ventures. Estimated reserves: 1-million tons.

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## United States Steel

# PERSONALS

W. E. Goodman

H. Goodman

**William E. Goodman** has retired as chairman of the board, Goodman Manufacturing Co., Chicago. Succeeding him is **Howard Goodman,** who continues as president and chief executive officer, a position he has held since 1958. **John S. Newton** has been appointed executive vice president, and will devote attention to the coordination of the company's engineering and manufacturing activities as well as continuing responsible for mine machinery engineering and development.

W. E. Goodman has been active in the mining industry since 1920 when he accepted a job in the engineering department of the Goodman company, founded by his father in 1900. Over the years, he has been closely identified with the American Mining Congress, serving as a member of the board of governors, manufacturers' division, for several years and taking an active part in its committee work. A most recent assignment is that of chairman of a committee on cooperation with government agencies.

**Harlow G. Rice** has been named to head the Coeur d'Alene Mines Corp. succeeding **Dr. H. C. Mowery** who died recently in Wallace. **Justice Rice** has been named to fill the vacancy on the company board. The company recently inaugurated exploration work at its holdings in the silver belt.

**Frank A. Seeton** was recently appointed manager of the metallurgical operations division of the Denver Equipment Co., where he will coordinate and direct the Denver ore testing division and the field service operations. The new division will provide help with flowsheet and recovery problems and also for mill equipment installation and start-up service throughout the world.

**Dennis E. Leary** has retired as superintendent of the Washoe Sampler in Butte, effective July 1. Leary served the Anaconda Co. for more than 40 years. He started work as a surface laborer at the Badger Mine, Butte, in 1915. A short time later he was transferred to the Washoe Sampler. During periods when the Sampler was closed down, he worked at the Anaconda and Anselmo mines. He was chief clerk at the Sampler for many years before becoming superintendent.

With his retirement, the Sampler has been closed and the work transferred to Anaconda.

**F. A. McGonigle** has resigned as vice president in charge of mining for Howe Sound Co. **S. J. McCarroll** was appointed manager of mining with over-all supervision of Howe's mining activities. McCarroll was also made a vice president of Tungsten Mining Corp. and Manganese, Inc., divisions of Howe Sound. He will maintain his headquarters at Henderson, Clark County, Nev., where Manganese, Inc., has a mine and processing plant.

**Charles M. Romanowitz,** internationally known dredging expert, has opened a consulting office at 2034 Santa Clara Ave., Almeda, Calif. He is immediately available for consultation in dredge application and operation, both bucket-line and hydraulic.

C. M. Romanowitz

He is best known for his 50 years of connected bucket-line dredging experience, but has equal experience with hydraulic dredges.

From 1920 through 1958, he was responsible for recommending and installing all dredges for the Yuba Manufacturing Co. From 1912 to 1920, he held a similar position with the Natomas Co.

For the last three and one-half years he has been with the Ellicott Machine Corp. on a full-time basis with headquarters in San Francisco. He will be retained by Ellicott as a consulting engineer.

## APPRECIATION

**George W. Potter,** a well-known Tri-State mine operator for more than 45 years, died in Joplin, Missouri, February 16, 1961. Born in Galena, Kansas, January 27, 1892, he studied civil engineering at the University of Missouri, but dropped out before graduation to form an engineering partnership in southern Texas. A surveying assignment for the Eagle-Picher Lead Co. brought him to the Tri-State Mining District on June 1, 1915, when the first two shafts on the new zinc and lead discoveries at Picher, Oklahoma, were being started. He accepted an offer to supervise the company's extensive drilling operations and shortly after, when one of the company management resigned and the other became incapacitated, Mr. Potter explained, "I seem to have taken over automatically . . ." With characteristic modesty, he attributed his advances through the years from surveyor to executive vice president of the Eagle-Picher Mining and Smelting Co. to the absence of those in charge "and someone had to act." However, he was a natural leader, doer and planner, who was bound to rise to the top of any group of which he was a part.

Among his numerous accomplishments:

He was the prime mover for the purchase of the Commerce Mining and Royalty Co. properties in the Oklahoma-Kansas mining field in 1938;

He initiated and built the Eagle-Picher Central Mill (capacity 3600 tpd) in 1932 in the midst of the depression and gradually enlarged it to 15,000 tpd capacity. This unit was the largest source of zinc for World War II and replaced more than 20 small mills, thus materially reducing production costs.

Mr. Potter was a natural prospector and a courageous and decisive mine developer. His foresight and planning prolonged the life of the Oklahoma field many years. Under his direction, ore search investigations (and mining in many cases) were undertaken for his company in nearly every part of the United States and also southwest Alaska, Mexico and parts of Canada. To a friend he wrote: "I had the pleasure and good fortune to continue with these operations until September, 1944." Five years later he purchased the mineral rights on the 60,000 acre Ortiz Grant near Santa Fe, New Mexico and in 1961, with Dewey Sims, founded Potter-Sims Mines, Inc. with headquarters in Joplin. They have continued to prospect and develop the ores on the grant. This partnership also operated the West Side mine near Alba, Missouri and the Snapp, Ritz, and Sucker Flat mines in the Tri-State District.

Mr. Potter's interests were many and varied with business problems always first, but when time permitted, the circus and ranching gave him relaxation. He owned a motorized circus employing two hundred people which toured many western and central states, then disbanded during World War II. Some of his vacations were spent traveling with Ringling Brothers Circus. He operated a 3,000 acre cattle ranch near Joplin for many years, was a long time member of Circus Fans of America, and of the Boy Scouts of America, from whom he received the Silver Beaver award, the highest Council honor in adult Scouting. He was a member of A.I.M.E. since 1917.

Mr. Potter always shunned the limelight but had a very wide acquaintance and many friends in all walks of life. He always tried to be available to everyone and his spontaneous friendly greeting and optimism will long be remembered by all who knew him. He travelled extensively on Eagle-Picher business in the United States and Mexico, and later visited South America, southern and eastern Africa and parts of Europe.

To those who knew him well, George Potter was a heroic figure. Creativeness was in his blood and bone, he gave and inspired loyalty, and monetary rewards were only a means to dig somewhere else. He was of the breed that makes mining different, dynamic and greater, something more than mere grubbing, trading and money-getting.

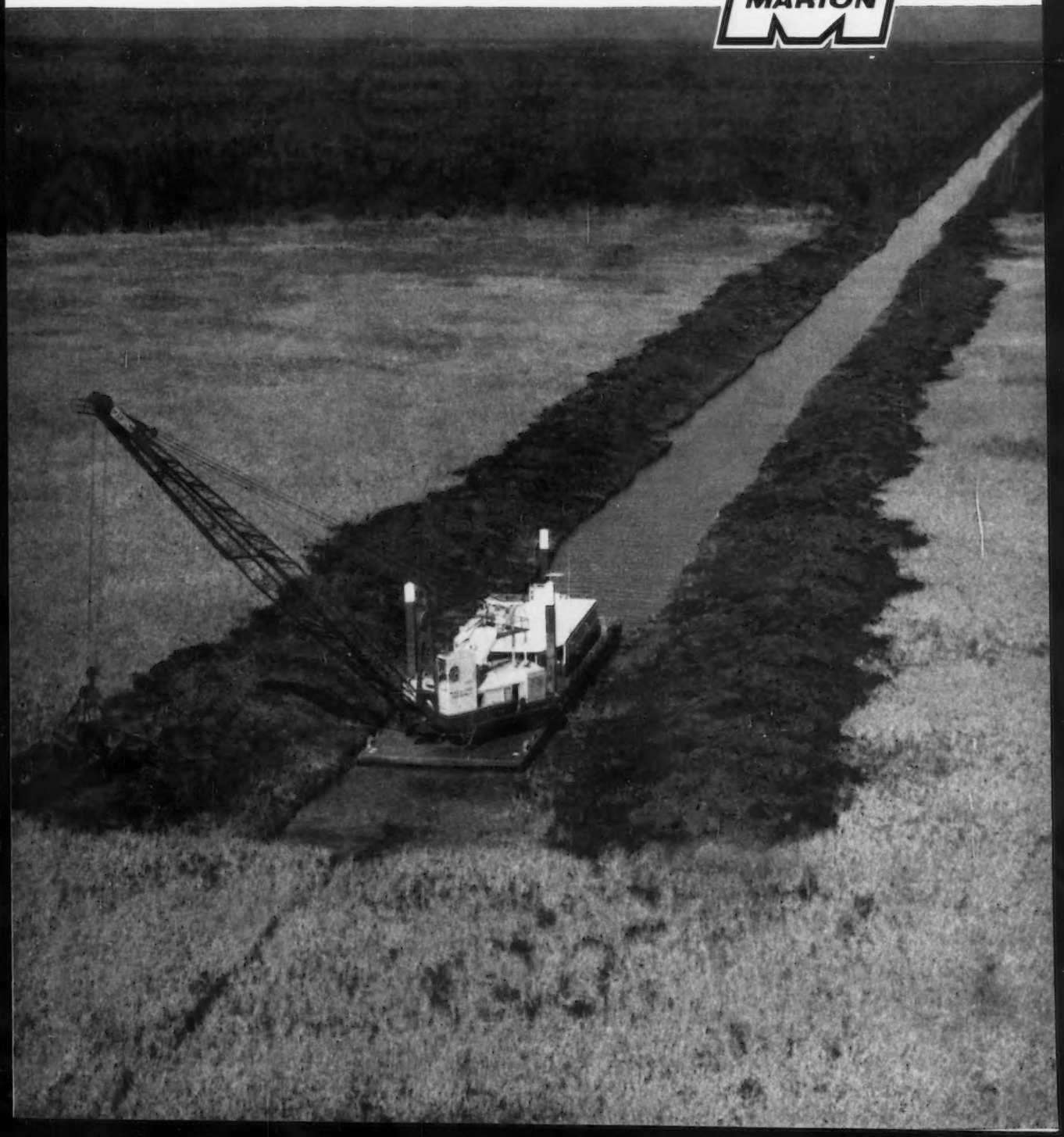
George M. Fowler

Evan Just

# THIS IS MARION QUALITY ... and the story of a Do-It-Yourself River.

PROBLEM: Dig a canal 39′ wide and 8′ deep through the cypress-studded swamp lands in southern Louisiana for a network of pipelines that will help release the vast oil and gas resources waiting to be tapped in this area. DIGGING: Murderous. Complex systems of cypress stumps, sometimes measuring 20′-25′ in diameter, ignore the efforts of conventional excavating equipment. SOLUTION: A barge-mounted 183-M equipped with a specially-built 15-yard clamshell bucket on 130′ of boom. It slugged along at an average of 800′ per day . . . up to 2000′ in better going. CONCLUSION: There are excavators and there are excavators. This unit, like all the rest of the Marion line, is worthy of the name. Marion Power Shovel Company, Marion, Ohio. A Division of Universal Marion Corporation.

MARION



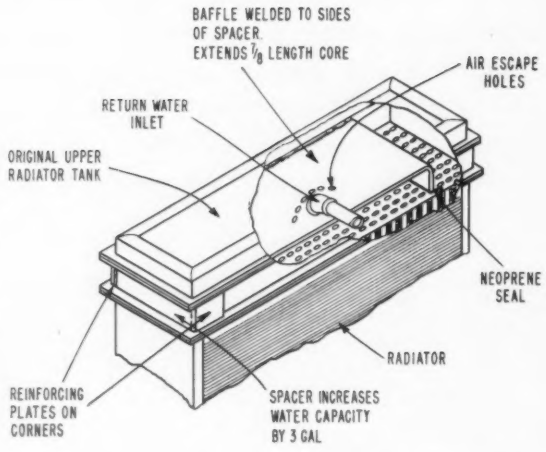
# OPERATING IDEAS

## Pima Whips Cooling System Corrosion, Increases Engine Life

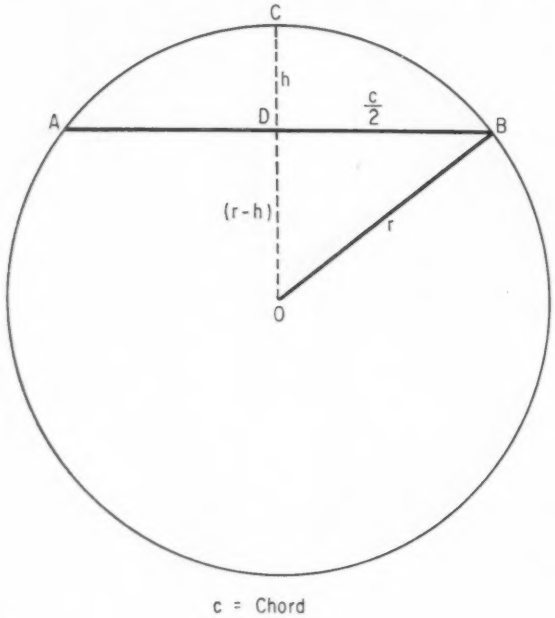
BY USING chemically-treated soft water in a diesel-engine cooling system, Pima Mining Co. got three times the engine operating life before change-out (removal for overhaul) in 1960 (10,083 hours) as it did in 1959 (3445 hours). Pima's problem was that corrosive water damaged cylinder liners and the block at the lower end of the liners of the Cummins diesel engines that power its large haulage trucks.

Although Pima, which operates a copper pit near Tucson, Ariz., tried several methods to overcome the problem, the best results were obtained by using softened and chemically treated water and by modifying the radiator to increase its capacity three gallons.

The water now used comes from a water treatment plant consisting of a water softener unit using Dow X-50, a synthetic Zeolite and a 600-gal water storage tank containing a basket near the top to accommodate Nalco 38 or 39, a chemical to control the pH of the water received from the water softener unit. This chemical also coats the cylinder liners and engine block, thereby reducing attack from corrosion to a minimum. Water from the softener is transferred to the storage tank and discharged into the basket with the Nalco charge by a centrifugal pump. It also recirculates underflow from the storage tank for a desired period, the pipe carrying the underflow being connected to the pump suction line and the bottom of the 600-gal storage tank.


BAFFLE WELDED TO SIDES OF SPACER. EXTENDS 7/8 LENGTH CORE
AIR ESCAPE HOLES
RETURN WATER INLET
ORIGINAL UPPER RADIATOR TANK
NEOPRENE SEAL
RADIATOR
REINFORCING PLATES ON CORNERS
SPACER INCREASES WATER CAPACITY BY 3 GAL

The change made on the radiator, shown (right), consists of a spacer placed between the radiator body and the top section that contains the water inflow connection and the capped opening for adding water. Since adoption of the practice, there has been a material increase in the engine change-out period (time engine is put into the truck to removal for overhaul). In 1960, it averaged 10,083 hours, in contrast to 3445 hours in 1959 and 5125 hours in 1958.




c = Chord
r = Radius
h = Depth to contents

## A Tank-Volume Formula

THE FOLLOWING LETTER was sent to E&MJ by Robert Mitchell. Since Mitchell's formula checks closely with the formula containing inverse notation, his formula could be worked without looking up values for $\cos^{-1}$.

Various tabular schemes are available in handbooks for determining this volume, but where they are not available, Mitchell's formula could be used for computing volume.

**Dear Sir:**

As a subscriber to your fact-full magazine, I wonder if I could ask you to test the validity of the enclosed formula . . .

It is a formula to find the volume of the contents of a cylindrical tank lying on its side—a problem which confronts many mines when the time comes for a full inventory. Last year while working in a mining engineering office at East Sullivan Mines in Val d'Or P.Q., I was called upon to accomplish this task. Being only a high school student at the time and not knowing inverse notation, I proceeded to work out my own formula.

Against the existing formula, which states that:

$$V = l\left[\pi r^2 - r^2 \cos^{-1}\left(\frac{r-h}{r}\right) + (r-h)\sqrt{2rh - h^2}\right]$$

my own formula states

$$V = l\left[\pi r^2 - \left(\frac{32rh^2 - 13h^3}{12\sqrt{2rh - h^2}}\right)\right].$$

The proof is as follows:

From a textbook, A of a segment $= \frac{2}{3}ch + \frac{h^3}{2c}$

In $\Delta$ DOB, $OB^2 = DO^2 + DB^2$, or $r^2 = (r-h)^2 + \left(\frac{c}{2}\right)^2$.

Solving for c in terms of r and h, $c = 2\sqrt{2rh - h^2}$.

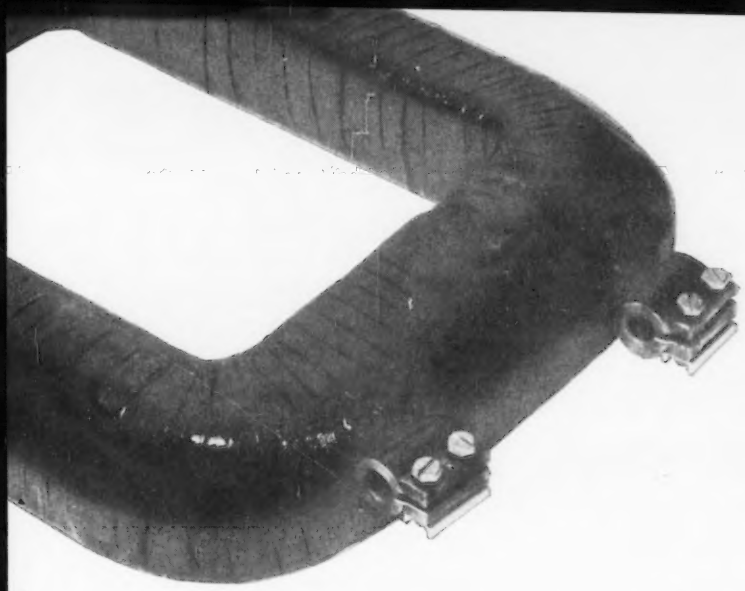
Therefore A of segment $=$

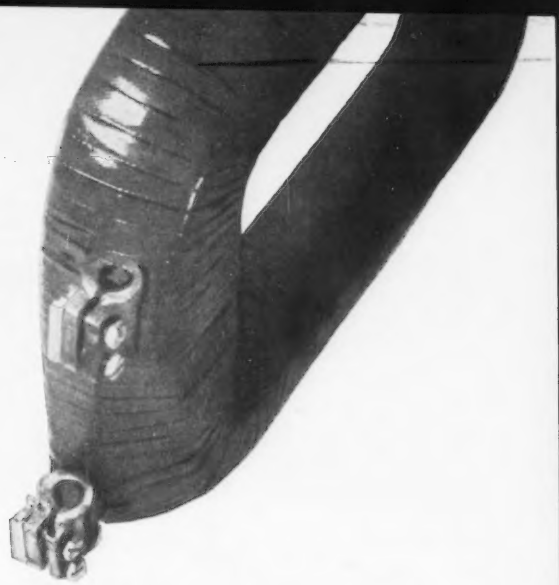
$$\frac{2h\ (2\sqrt{2rh - h^2})}{3} + \frac{h^3}{2\ (2\sqrt{2rh - h^2})}.$$

Simplifying, $A = \frac{32rh^2 - 13h^3}{12\sqrt{2rh - h^2}}$.

Therefore the desired volume, V, is

$$V = l\left[\pi r^2 - \left(\frac{32rh^2 - 13h^3}{12\sqrt{2rh - h^2}}\right)\right].$$





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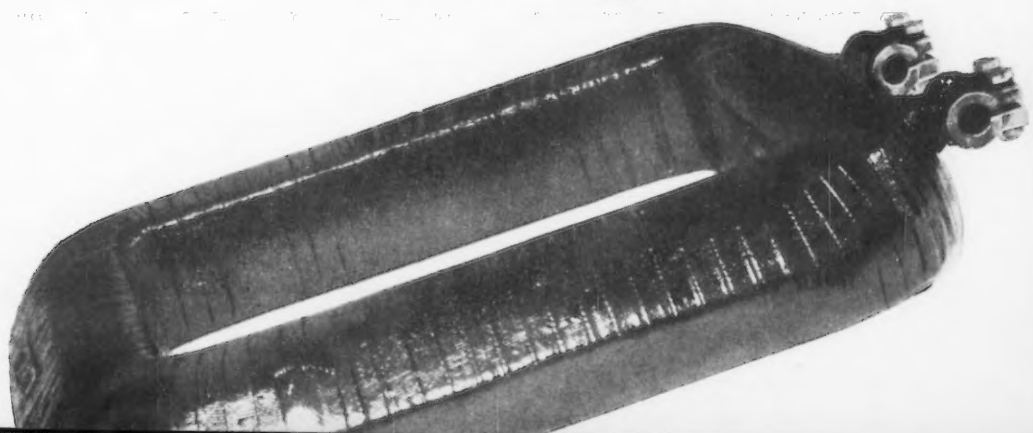


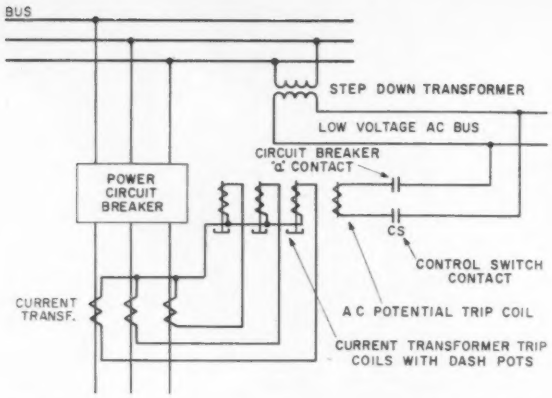



FIG. 5. Current transformer trip with circuit opening relays. During normal operation, secondary current from current transformer ciculates through the relay coil and its normally closed contact. When an overcurrent occurs, a relay operates to transfer current to trip coil in order to open breaker.

used with any type of relaying in place of a battery, it is not usual where complex and expensive relaying is installed. Where this type of relaying scheme is considered economically justified, the additional cost of a battery is usually also considered justified. A capacitor trip has a lower first cost than a dc trip because the battery is not required.

An ac trip without control by relays is the most economical since neither relays nor battery are required —but it is also the most limited. The trip is dependable because the energy to trip comes from the fault current itself. It is useful where the only requirement is that the breaker shall trip an overcurrent after some time delay. The principal limitation is lack of accuracy in time settings because the dash pots which provide time delay are much less accurate than overload relays and selectivity is consequently poor. It is not recommended to coordinate the tripping of the breaker with other devices. Nevertheless, this trip is useful where more refinement is not economically justified. Principally it is used with small isolated manually-operated breakers.

An ac trip with circuit closing relays is similar to one without relays in that it derives energy to trip from the fault current. However, it avoids some of the latter's limitations since overcurrent relays obtain accurate current and time settings. Selectivity is thus relatively good. This trip, like all current transformer (ac) trips, should be used only where selectivity is adequately determined by time and current magnitude. It is also limited by the high burden imposed on the current transformer (approximately 6 ohm) by the reactors.

An ac trip with circuit closing relays should be used only where current transformer capacity is ample and fault currents are expected to be high. Cost is, of course, higher than a trip without relays, since these must be purchased and installed.

An ac trip with circuit opening relays is similar to one with circuit closing relays except that burden in current transformers is relatively low and it is therefore satisfactory for use with bushing-type current transformers. The secondary current, which the circuit-opening contacts of the relays transfer, should be less than about 100 amp. A circuit-opening relay should be used where the secondary currents, due to faults, are expected to be low, and a circuit-closing relay where they will be high. Circuit opening relays are usually slightly more expensive than circuit closing relays.

An ac potential trip is generally used only for switching and is never recommended for automatic tripping on faults because of the possible low voltage during a fault. It is sometimes used in combination with a relay controlled trip for tripping from ground relays on the assumption that any ground fault which is high enough to seriously reduce the voltage of the breaker will operate one of the phase relays. Ground relays can be used with schemes shown in Fig. 1, 2, 4, and 5.

## Battery Installations Vary With Application

Lead-acid storage batteries, which have time-proved reliability and long life, are customarily installed with trip switchgear. Standard voltages are 48, 125 and 250 and occasionally 24. Because the battery is large, heavy and requires housing, installation cost is high. Where economy is necessary and the battery's only function is to supply energy for dc trip, the advantages of dc trip may be retained at reduced cost by using another type of battery.

For very small isolated breakers, one or more dry cell 45-v "B" batteries of good quality may be sufficient. A disadvantage is that they sometimes must be replaced every six to eight months. A better solution is to use the relatively new nickel-alkali battery with sintered plates. These can also be used on larger isolated breakers. Where they supply only energy for tripping, this type of battery can be very small and light, compared to the lead-acid type. Sometimes they may be installed complete with charger in the same housing with the relays or in the operator cabinet of an outdoor breaker with considerable reduction in installation cost. This type of battery is not low in price but requires little maintenance and is expected to have long life.

Dc trip from a battery is regarded as the one thoroughly reliable method which is universally preferred except where economy is an important consideration. Capacitor trip probably rates second as it can retain all the accuracy and selectivity of dc trip by utilizing the same relays. Where simple overcurrent protection with accurate time delay provides adequate selectivity, ac trips with relay control may be the best choice. Ac trips without relay control rate last in performance but are dependable and economical where accuracy is not essential.

## Supplementary E&MJ References on Power

"What the Mining Man Should Know About Power Conversion," July 1961, p. 73.

"Progress in Power Rectifiers," June 1960, p. 231.

"Silicon Rectifiers," March 1960, p. 45.

"Thermionic Power Conversion," June 1960, p. 224.

"The Fuel Cell," June 1960, p. 224.

"The Electromagnetic Drive," June 1960, p. 230.

"Magamp Improves Anode Casting at Inspiration," Lydick & Risler, May 1960, p. 104.

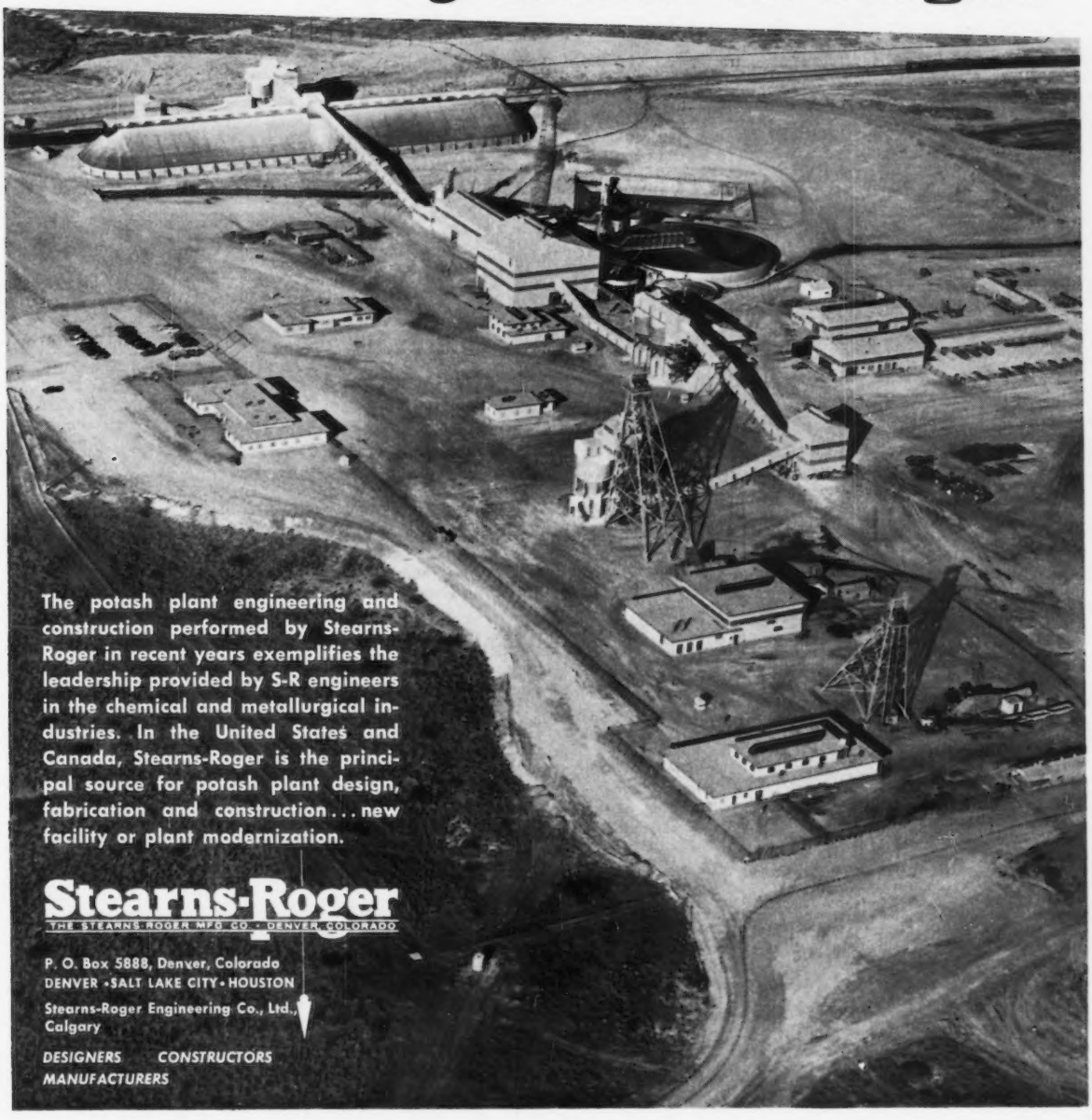
"Westinghouse Develops Maintenance-Free AC Drive," May 1960, p. 47.

"Fuel Cell Powers Demonstration Tractor," Nov. 1959, p. 168.

# processing plants

# for potash

# by Stearns-Roger



The potash plant engineering and construction performed by Stearns-Roger in recent years exemplifies the leadership provided by S-R engineers in the chemical and metallurgical industries. In the United States and Canada, Stearns-Roger is the principal source for potash plant design, fabrication and construction... new facility or plant modernization.

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# NEW BOOKS *(Continued)*

**Handbook of Fluid Dynamics,** written by a staff of specialists and edited by Victor L. Streeter. This handbook broadly covers fluid flow principles, theory, methods and allied data. Although the coverage is highly practical, theory is included where necessary for a clearer understanding of the underlying principles. Divided between fundamental concepts and applied fields, the book contains authoritative discussions of basic equations of fluid flow, laminar flow, flow with chemical reaction, compressible flow, and cavitation. Among the other subjects are turbulence, motion of immersed and floating bodies, two-phase flow, flow measurements, sedimentation, turbomachinery and pipelines. Published by the McGraw-Hill Book Co. 330 W. 42 St. New York 36, N.Y. 1240 pp. Price $24.00.

**Handbook of Chemistry,** tenth edition, compiled and edited by Norbert Adolph Lange. Widely accepted for over a generation as the classic work in the field, this handbook is a vast, authoritative compilation of facts, data, tabular material and experimental findings covering every aspect of chemistry. Of the many detailed tables contained in the book — tables of solubility, density, refractivity, viscosity, electrical, thermal, vapor pressure, and other specific properties — a large number have been completely rewritten in the tenth edition. Published by the McGraw-Hill Book Co., 330 W. 42 St., New York 36, N.Y. 1969 pp. Price $11.00.

**International Tin Council, 1960 Statistical Year Book.** This book covers consumption, production and uses of tin by country. Also included are statistics on trade in canned goods by country. Published by the International Tin Council, Haymarket House, 28 Haymarket, London, S.W.1, England. 284 pp. Price $9.00 post free.

**Annual Report of the Director of the Mint** for the fiscal year ended June 30, 1960, including report on the production and consumption of gold and silver for the calendar year 1959, Treasury Department Document No. 3219. Production consumption, coinage, and monetary stocks are tabulated by country. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D.C. 127 pp. Price 40¢ (paper cover).

**Annual Report to Congress of the Atomic Energy Commission for 1960.** This book details the complete activity of the AEC for 1960. From the foreword "The domestic mining and milling industry has been placed on a stable basis with production being brought into balance with current military needs and civilian requirements. There is a potential for prompt expansion whenever needed. Domestic sources now supply slightly more than half the total amount of uranium we require annually." Published by the United States Government Printing Office, Washington 25. D.C. 544 pp.

**CED Cooperation for Progress in Latin America—A Statement on National Policy by the Research and Policy Committee of the Committee for Economic Development.** This booklet is more than a statement of policy. It's an up-to-date profile of Latin America's economic and social position on a country-by-country basis. The report has been prepared by a competent panel of leading businessmen and industrialists. Its mission, involving many months of study, has been to examine the social and economic bases for progress in the future development of Latin America, including population trends, education and literacy achievements, and economic aspects of 20 Latin American countries. Attractive tables, charts and maps show population trends, life expectancy, labor force in agriculture, illiteracy, educational attainment, export dependence on single commodities, area distribution of trade, U. S. direct investment in Latin America including mining and smelting from 1942 to 1959 inclusive, cost of living indices, growth rates in Latin American exports and imports. This report is an impressive contribution toward the mutual understanding and cooperation of nations of the Americas. Available at the Committee for Economic Development, 711 Fifth Ave., New York 22, N.Y. Pp 56. Price $1.

**BOOKS presented on this page may be obtained directly from the publisher mentioned in each case. E&MJ does not sell books.**

**The Aero Relief Map of Africa.** This ten-color plastic relief map measures 45 x 49 in. Up to 1-in. relief, the map contains 1500 geographical names, including 21 new African nations. Available from Aero Service Corp., 210 E. Courtland St., Philadelphia 20, Pa. Scale 1:8,000,000.

**The Rungwe Volcanics at the Northern End of Lake Nyasa,** by D. A. Harkin. This systematic study covers geology, history, petrography and petrology. Available from the Department of Geological Survey, Dodoma, Tanganyika, East Africa. 172 pp plus maps. Price Shs. 25/-.

**Geologic Map of California, Westwood Sheet.** Available from the State of California, Dept. of Natural Resources, Div. of Mines, Ferry Bldg., San Francisco, Calif. Scale 1:250,000. Price $1.50.

**Volcanoes of Tongariro National Park,** Information Series No. 28, by D. R. Gregg. Available from the New Zealand Dept. of Scientific and Industrial Research, Wellington, New Zealand. 82 pp. Price 7s. 6d.

**Nepheline Syenite Deposits of Southern Ontario,** Volume LXIX, Part 8, 1960, by D. F. Hewitt, with contributions by H. S. Armstrong and C. E. Tilley. Available from the Ontario Dept. of Mines, Toronto, Ont. 194 pp. plus maps.

The following publications are for sale by the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

**Summary of Mining and Petroleum Laws of the World,** USBM Information Circular 8017, by Northcutt Ely. This excellent summary of world mining laws by Mr. Ely, a Washington attorney, is believed to be the first such summary on a global basis published. Short summaries are indexed by country. 215 pp. Price $1.00 (paper cover).

**Research and Technologic Work on Explosives, Explosions, and Flames, Fiscal Years 1957 and 1958,** USBM Information Circular 7999, by Ruth F. Brinkley and R. W. Van Dolah. 30 pp. Price 25¢.

**Geophysical Abstracts 183, October-December 1960,** USGS Bulletin 1116-D, by James W. Clarke, Dorothy B. Vitaliano, Virginia S. Neuschel, and others. 636 pp. Price 40¢. Subscription price $1.75 a year; 50¢ additional for foreign mailing.

**Geology of the Shaviovik and Sagavanirktok Rivers Region, Alaska,** Exploration of Naval Petroleum Reserve No. 4 and Adjacent Areas, Northern Alaska, 1944-53, Part 3, Areal Geology, USGS Professional Paper 303-D, by Samuel Keller, Robert H. Morris and Robert L. Detterman. 222 pp plus maps.

**Aerial Photographs in Geologic Interpretation and Mapping,** USGS Professional Paper 373, by Richard G. Ray. This book explains how to interpret aerial photographs and gives numerous photographs with their interpretations. 230 pp. Price $2.00 (paper cover).

**Geomorphology and Forest Ecology of a Mountain Region in the Central Appalachians,** USGS Professional Paper 347, by John T. Hack and John C. Goodlett. Prepared in cooperation with the Harvard Forest, Harvard University. 66 pp plus map.

**Primary Textures and Mineral Associations in the Ultramafic Zone of the Stillwater Complex, Montana,** USGS Professional Paper 358, by Everett D. Jackson. Discusses the petrographic features and origin of layered chromites, bronzites and harzburgites. 106 pp. Price $1.00 (paper cover).

**Joints in Precambrian Rocks, Central City-Idaho Springs Area, Colorado,** USGS Professional Paper 374-B, by J. E. Harrison and R. H. Moench. 14 pp. Price 20¢ (paper cover).

**Vanadium-Uranium Deposits of the Rifle Creek Area, Garfield County, Colorado,** USGS Bulletin 1101, by Richard P. Fischer, with a section on mineralogy by Theodore Botinelly. 52 pp plus maps.

**Tofty Tin Belt, Manley Hot Springs District, Alaska,** USGS Bulletin 1058-1, by Russell G. Wayland. Emphasis is on economic geology. 51 pp plus maps.

## 250,000 BBL. FUEL TANK SEALED BY HALLIBURTON GROUTING

Uncontrolled water flow was entering this 250,000 bbl. LPG underground storage cavern through fissures — some as wide as ¼" — in the ceiling and sides of the cavern during its excavation.

To stop this troublesome water problem, the mining engineer called on Halliburton Pressure Grouting Service. Since prior grouting jobs using conventional materials and methods had failed to stop the water flow, Halliburton recommended treatments with HYDRO-LOK (PWG). This is a low-viscosity chemical grout with a controlled fluid time, allowing it to reach the water bearing zones. It then sets very quickly to form a stiff gel effectively sealing off the flow of water.

Some 600 separate injections of HYDRO-LOK (PWG) were made, varying from 3 gallons to 800 gallons each. A total of 7,946 gallons of HYDRO-LOK (PWG) and 736 gallons of Halliburton Hydromite was pumped into the fissures existing throughout the cavern. After 33 working days, more than 95% of the water flow had been stopped.

If you have an underground water problem, call on Halliburton to help you solve it. Contact the Halliburton Division Office nearest you, or write direct to:

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PRESSURES for an increased silver price were toted up by Robert M. Hardy of Sunshine Mining Co.

ASARCO'S J. C. Keiffer is the new president of the association. July meeting drew 180 registrants.

## Idaho Mining Association *(Continued)*

He said the new duplex system of chrome plating zinc die casings has firmed up the industry's position in the automotive fields and he said he expected more zinc to be used on 1962 and 1963 cars. Resistance spot welding of galvanized steel could offer a market for an additional 100,000 tons of zinc a year, he indicated.

**The direct reduction method** of treating iron ore may offer possibilities for the development of iron ore resources in the state of Idaho, a geologist for the Idaho Bureau of Mines and Geology, told the convention. A. E. Soregaroli said that because known iron deposits of Idaho are somewhat smaller than those of the Great Lakes, reducing processes involving blast furnaces are simply not economical.

"For one thing," Soregaroli said, "the blast furnace requires metallurgical coking coal as fuel. For another, iron ore used in the blast furnace must be relatively free from impurities. If we are to think of a steel industry in Idaho, therefore, we must rely upon other methods of smelting iron and making steel: we must adopt a new technology. One such technological solution is the direct reduction process of treating iron ores, one of the earliest methods used to smelt iron ores."

He said modern direct reduction processes have eliminated the problem of impurities, making it possible to use low grade ores, contaminated ores and ores so fine they would choke a blast furnace. The direct reduction process, he added, can be used in either of two ways, depending upon the ultimate product. It can be used to convert iron ores into sponge which can be used for the production of steel and it can be used to produce molten steel directly in an electric furnace where the carbon content of the steel can be controlled.

**Robert P. Dwyer,** minerals consultant for the Senate Committee on Interior and Insular Affairs, described the legislative outlook for gold and silver.

"Gold and silver legislation is dead for this session of Congress," he said.

Reports received from the Bureau of the Budget, Department of Interior, Department of State and the Treasury Department all oppose enactment of proposed gold subsidy measures "because of the uncertainty and speculation with regard to future gold prices which would result in foreign countries where the legislation might be regarded as leading toward a modification of the U.S. monetary system."

In essence, the Administration states that gold subsidy payments would be harmful by encouraging uncertainty, particularly with regard to U.S. future gold prices.

The importance of beryllium and its occurrence in Idaho were outlined by Raoul Choate, minerals engineer with the Idaho Bureau of Mines and Geology.

He said solution to a few problems could radically change the present limited outlook for the beryllium market. He said that the problem of poor ductility of the metal must be solved, large reserves must be located and a way must be found to recover the beryllium.

Choate said that since the start of a cooperative investigation of beryllium deposits in Idaho by the Idaho bureau and the U.S. Bureau of Mines last year, six new areas containing beryllium have been disclosed.

The most important discovery to date, he said, is located 40 miles northwest of Sun Valley in the Sawtooth Mountains. Other deposits have been disclosed in Lemhi County north of the Yellowjacket district, in Elmore County along Sheep Creek, in Gem County 40 miles north of Boise, in Idaho County 15 miles east of Grangeville, and in Bonner County near the Idaho-Washington state line. The only recorded proven occurrence of beryllium in the state before the cooperative survey was launched was in the Mica Mountain area of Latah County.

**Recent court decisions** on discovery requirements were cited in a talk by Raymond B. Holbrook, Salt Lake City attorney.

"The decisions evidence a realaxing of the showing required as proof of discovery," he said. "It is to be expected that the position of the senior locator would be viewed sympathetically in a contest with a junior locator; however, disregard of the requirement of discovery by the courts tends to weaken the mining laws."

"Recent decisions of the Department of Interior evidence a trend toward a concept that a producing mine is a condition precedent to a valid mining location," Holbrook said.

"The problems of the mining claimant whose patent application is rejected on the ground of lack of discovery have been increased by the recent change in the Department's long standing practice of merely rejecting the application for patent and not declaring the claims to be invalid. The department now maintains that a challenge to a mining claimant's right to patent for want of discovery requires an adjudication of the validity of the claims, and that an adverse decision on the issues of discovery, necessarily results in a declaration that the claim is null and void."

"How long can mining endure under a system where one doing exploration work is a mere tenant at will, subject to dispossession by the Department of the Interior; where there is no real security or tenure until he has proven by a profitable operation, that the mineral showings he relied on in spending labor and money in exploration have led to a valuable mineral deposit?" Holbrook asked.

The time has come, he said, for the mining industry to take a firm stand against Administrative application of the rule of discovery in a manner which is destroying the mining laws by erosion and indirection.

"If the mining laws are to be repealed, the repeal should be by forthright action of Congress and not be an Administrative course which renders them unworkable."

**The expanding activity** in the industrial minerals of Idaho was stressed by Charles W. Sweetwood, assistant manager of mines for J. R. Simplot Co. at Boise, Idaho. He cited the growth of the state's phosphate industry in the past 20 years. Production of phosphate rock and phosphate shale products this year, he said will amount to 2,250,000 tons with a value of more than $9-million. This compares with 200,000 tons worth about $1-million produced 20 years ago.

*(Continued on p 105)*

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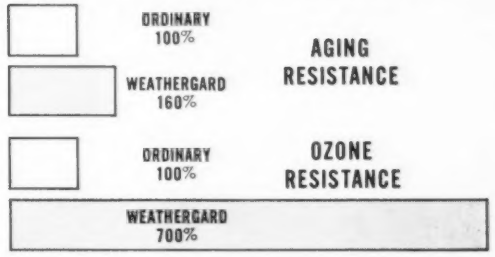
In recent tests, the new WeatherGard cover for Giant Conveyor Belting was subjected to seven times the ozone torture that causes ordinary belt covers to crack and, in turn, fail. The WeatherGard did not crack nor did it give any indication of cracking even after these exhaustive tests.

Further pointing out the toughness and durability of the WeatherGard were tests that showed it to have a substantially greater resistance to cracking from accelerated aging.

In addition, the WeatherGard cover resists damage from smog, sunlight, and weather checking. And . . . besides protecting against these factors that cause ordinary belts to fail, U.S. Giant with its WeatherGard cover is abrasion and wear resistant.

*The new WeatherGard cover is standard on all U.S. Giant Conveyor Belting at no extra cost. See your US Representative or Distributor.*

**COMPARE THE RESULTS OF TESTS BETWEEN WEATHERGARD AND ORDINARY BELTING**

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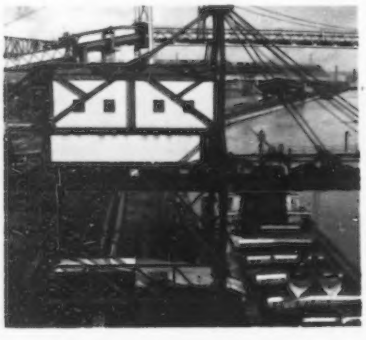

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Over 45% of sinter capacity added by U.S. steel industry in last 5 years has been furnished by Dravo—including this 2400-ton-per-day plant. Check coupon for information on sintering, briquetting, pelletizing and ore beneficiating facilities at mine or plant site.

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Head frame (left foreground of photo) sits astride 575-ft. concrete-lined ventilating shaft at an eastern coal mine. Construction of shafts, slopes, tunnels, docks and harbors are part of Dravo's half century of experience in special construction for the mining industry. Mail coupon at right for more information.

Dravo furnished ore handling and agglomeration facilities for this midwestern steel producer.

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When completed, this modern intake and pumping station will handle up to 30 million gallons of water daily. Such Dravo turn-key projects include oxygen, power and boiler plants, compressor stations, special mine, utility and plant facilities. Check coupon for information.

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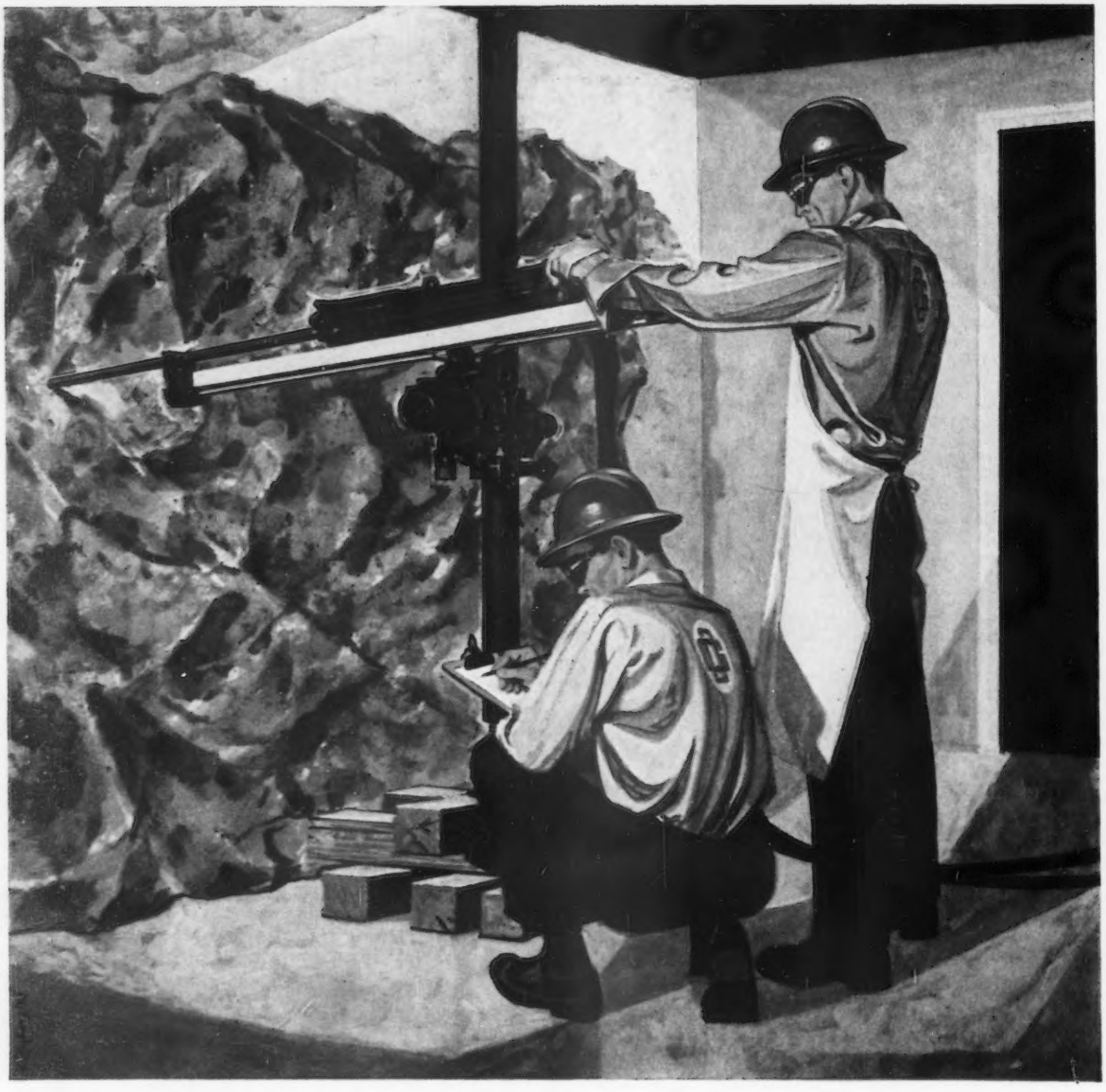

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But that's only the start. Before a Gardner-Denver rock drill goes on the market, it is thoroughly field-tested in actual mining operations. Then when the drill is sold to a customer, a Gardner-Denver Rock Drill Specialist inspects the drill at work on the site to make sure that it lives up to its promise.

The Gardner-Denver Rock Drill Specialist's chief job is to make *satisfied customers*—not just sales. You'll find it worthwhile to consult him about reducing your rock drilling costs.

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## Silver *(Continued)*

the past, for the requirements of industry."

While conceding that "in time, Treasury silver will no longer be available," the large silver processor sees secondary sources opening up at different price levels. It sees higher price levels can be expected, "but most definitely does not believe that the price will go anywhere near as high as the monetary one of $1.29 an oz."

Handy & Harman endorsed the Silver Users Association and its historic advocacy of a free market for silver, but noted its belief that, "so long as the Treasury is required by law to buy silver, it should continue its present selling policies."

SAMPLER works on a truckload from the newly opened "M" Pit.

## Federal-Gas Hills Opens Four New Pits

FEDERAL-Gas Hills Partners had developed four new pits in Wyoming's Gas Hills District to supply the partners 522-tpd mill well into 1975. The ore is eligible for processing in the 1962-1966 contract period.

Other ores at three present mines will not be utilized. The new pits, to be worked from a cloverleaf pattern as a single complex, are at shallow depth, contain higher grade ore (0.31% $U_3O_8$) and are only six miles from the mill. Ore from the previous worked sites was deeper, and required a 17.5-mile haul.

The ratio of waste to ore in the K,L,M, and N pits is one-fourth to one. The cloverleaf pattern is expected to aid equipment traffic in overburden removal and the mining of ore. Federal Resources is 60% owner of the firm and Gas Hills Uranium, of Wyoming, a 40% share holder.

## Lukens Looks at DR

THE NEWEST entry into the list of firms studying Direct Reduction is Lukens Steel Co., which has been operating a small pilot plant at Coatesville, Pa. Research officials are said to be enthusiastic


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With the separation of heavy mineral values so positive on the SuperDuty® table, you easily adjust for sharp concentrate bands as you watch the deck in operation.

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## Lukens—DR *(Continued)*

about the oxygen, natural gas, iron ore pellet process, according to the NEW YORK TIMES, and full evaluation is expected in 1962.

## Braden Copper Starts $6-Million Expansion

AN INCREASE of mine, mill and smelter capacity at Kennecott Copper Corp.'s Braden property, near Rancagua, Chile by 11,200 tons per year has been announced by vice president R.M. Haldeman.

Modernization of installed facilities, additions and expansions, with engineering, procurement and construction management by Kaiser Engineers, will increase annual output from 180,000 tons of copper to 191,200.

The expansion is to be completed by the end of 1961.

## New Firm May Dredge Offshore Diamonds

LARGE SCALE prospecting for diamonds oil and gold is to be carried out off the coast of South West Africa by the Marine Diamond Corp., which has a registered capital of R10,000,000 and which was registered in Windhoek last week. The promoters are United States and South African businessmen.

The Americans involved in the project visited South Africa recently and obtained concessions from the Government. They also discussed the matter with officials of De Beers who control the diamond market in this country.

The corporation believes that there are long stretches of diamond bearing land just off the South West African coast from Angola to the mouth of the Orange River. They claim that this was the reason for the interest shown by Russian trawlers off that coast recently.

The plan is to extract the diamonds from the bed of the sea by marine pumps, the diamond bearing sand being pumped ashore or on to floating plants for processing.

## Lamco Joint Venture Moves to '63 Output

THE Lamco Joint Venture mining scheme in Liberia made considerable progress in 1960, according to the company's annual report, published in Stockholm recently. Operations at the Nimba mine are scheduled to start in 1963.

All procurement and construction work is handled by the Swedish Grangesberg Co., which has established a special Liberia department. At the end of last year the Lamco staff totalled 1741, while Sentab, large Swedish contracting firm, employed 1034 on the various projects.

Contracts have been concluded for the building of the port at Lower Buchanan, the railway to the Nimba mine and roads in the mining district.

Work on the more than 250-kilometre railway from Lower Buchanan to Nimba commenced in May 1960 and by the end of the year half the distance had been cleared for construction to start. A road-building programme, including over 160 kilometres of roads, was completed.

## OME Contracts For Exploration Assistance

THE OME has approved minerals exploration contracts for Swansea Mines Inc., Helena, Mont., and Emerald Empire Mining Co., Corvallis, Ore. OME will pay one-half of the cost up to the authorized amount.

Swansea was authorized to spend up to $18,260 on exploration for Cu-Pb-Zn ores in Lewis and Clark County, Mont. and Emerald was authorized to spend up to $54,300 on exploration for Pb-Zn-Cu ores in Lane County, Ore.

Application forms and additional information about the minerals exploration program may be obtained from the following offices:

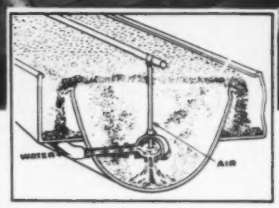
The Office of Minerals Exploration, Department of the Interior, Washington 25.

OME—Region I—South 157 Howard St., Spokane 4, Wash.

OME—Region II—113 Custom House, 555 Battery St., San Francisco 11, Calif.

OME—Region III—Bldg. 20, Federal Center, Denver 25, Colo.

OME—Region IV—Rm. 11, Post Office Bldg., Knoxville 2, Tenn.

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## New tips for more efficient maintenance

## Don't let storage tank contaminate gasoline

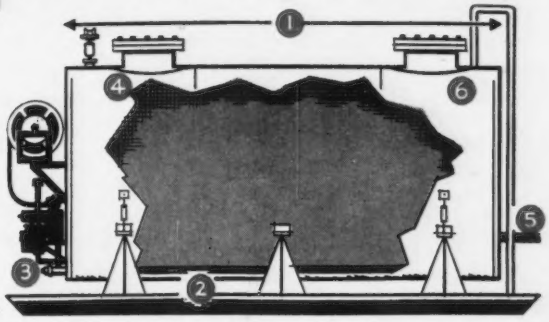
One of the basic essentials of good equipment performance is clean fuel; and the best way to make sure the fuel you use is as clean as the fuel you buy is to keep your own storage facilities up to snuff.

What does it take to make the ideal gasoline storage tank? Here are some of the specifics that Texaco engineers have found to be most important.

**The ideal gasoline storage tank has:**

**1.** Plenty of room. Every time you fill a tank you stir up the sediment at the bottom. The bigger the tank, the less it has to be refilled, and the longer the sediment stays settled on the bottom.

**2.** Welded construction.




**3.** A 1½" drain valve, located at the lowest point.

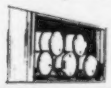
**4.** A large hand hole plate or manhole, to make cleaning easier.

**5.** A suction line to the gasoline pump located several inches above the tank bottom, to avoid drawing out the sediment and condensate.

**6.** A fine-mesh strainer over the filler opening.

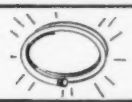
## Four tips to keep hydraulic oil clean in storage and handling

Even the best maintenance techniques won't keep your hydraulic equipment on the move if you don't keep the oil clean while it's in storage and while it's being put into the machine. Here are four simple precautions that will assure you of getting nothing but clean, clear oil in the hydraulic system:



**1.** Store the drums on their sides, indoors if possible, but in any event under some sort of shelter.

**2.** Before you open a drum, clean the top so that no dirt or water can fall into the oil.



**3.** Make sure that you use only *clean* hose and containers in transferring the oil from the drum to the equipment.

**4.** Filter the oil as it enters the reservoir on the machine. If the fill pipe on the equipment doesn't have a filter, use a funnel fitted with a 200-mesh screen.

## Protect diesel fuel injector with periodic tank drains

Dirt and water in diesel fuel can ruin a fuel injector in no time. Even if you keep the fuel clean during storage, there's still a good chance that temperature changes will create enough condensation in the fuel tank on your rig to start rusting in the injectors. Several operators have pretty well solved this problem by partially draining the fuel tank once or twice a week. Simply draw off about a gallon of fluid through the drain valve at the bottom of the fuel tank. You lose some fuel this way, but you also get the accumulated water and other contaminants clear out of the fuel system. The cost of the fuel you drain off is a small loss compared to the repair bills you save on the fuel injectors.

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Every month or so we'll bring you a batch of "sleepers," little angles, so easy to overlook, where big savings in money and time can be made. If Lube Logic doesn't solve your problem, call your local Texaco Lubrication Engineer. Anytime, all the time, he's your best source of money-saving lubrication ideas. Don't forget that "Lubrication is a major factor in cost control." Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

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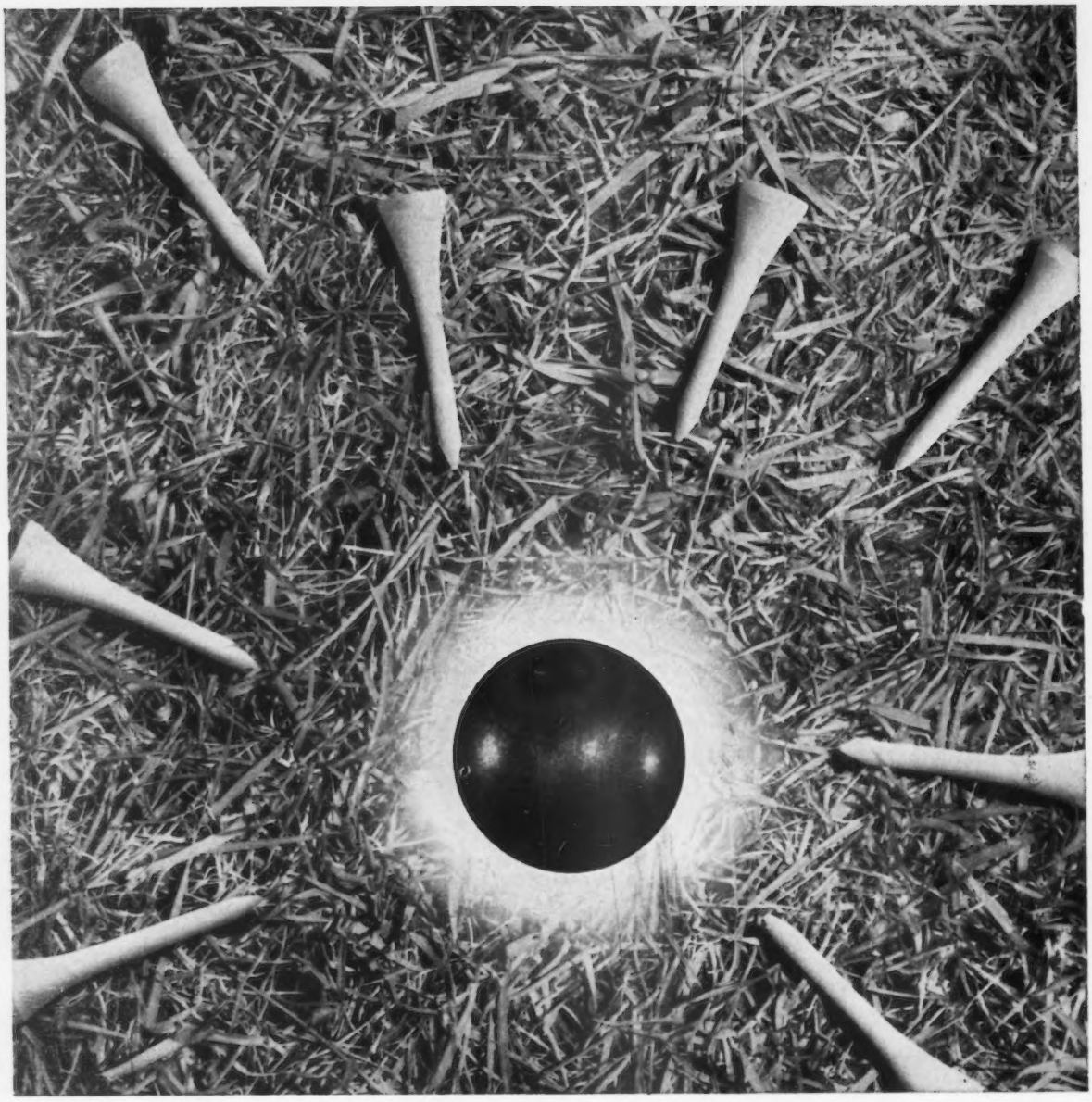

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# IN THE U.S.

## CALIFORNIA

**Work has begun on two new asbestos mills,** one representing a $5-million investment by Jefferson Lake Asbestos Corp. and the other a plus-$1-million project by Johns-Manville and Kern County Land Co.

The latter, with completion set for Oct. 15, will produce from 12,500 to 25,000 tons of fiber per year. It will work a 1500-acre deposit 20 miles northwest of Coalinga, on the Diablo Range. The fiber is defined as a type suitable for the manufacture of floor tile. Production is due in January 1962.

The larger new mill, to be producing in March of 1962, will produce 2500 tpd from a property in Calaveras County, with mining being contracted to Wells Cargo, Inc. The firm is a 77%-owned subsidiary of Jefferson Lake Sulphur Co.

**Surcease Mining Co., one of the major tungsten producers during World War II** and the Korean War, has closed down its operations at Atolia, San Bernardino County, and is selling mine, camp, mill and auxiliaries.

Block-leasing operations were suspended at the property in 1957 with the termination of the Government stockpile program — with developed ore left in the working faces and a favorable prospect indicated in virgin territory ahead. For some time the former Atolia Mining Co. was the main scheelite producer in the U.S.

## HAWAII

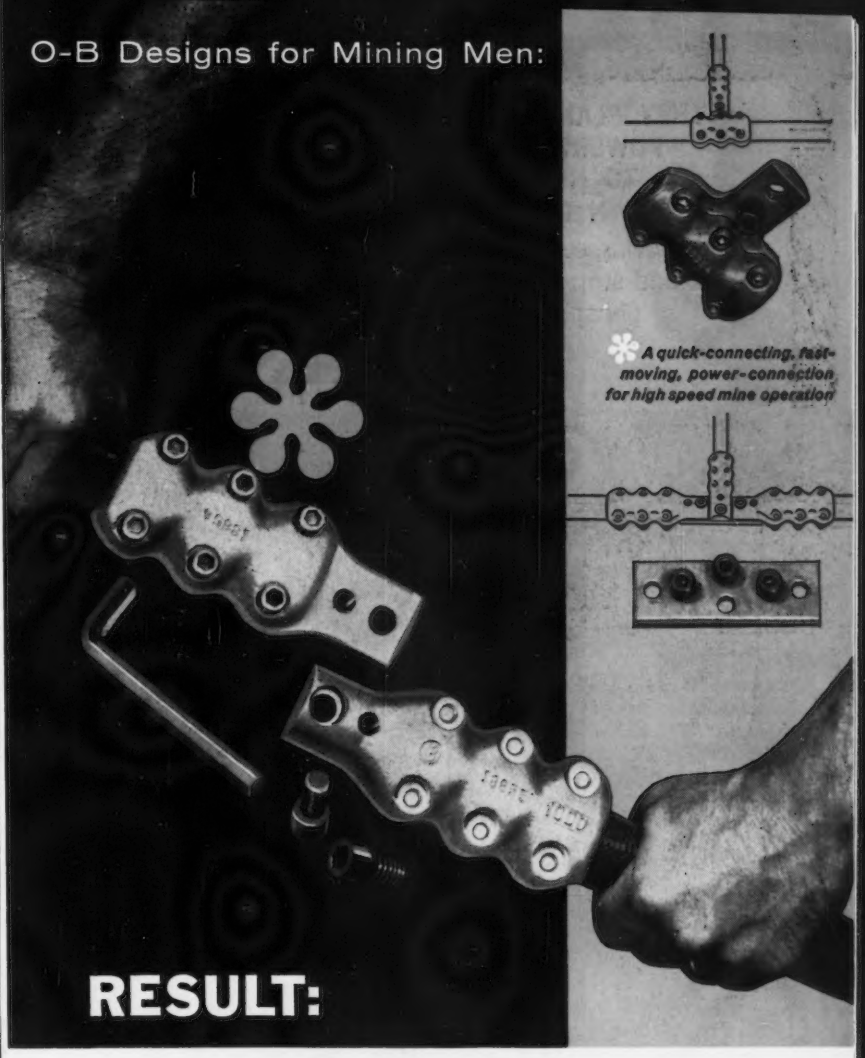
**Mineral production for 1960,** boosted by the introduction of two new Portland cement plants, rose from $7.6-million in value for 1959 to $9.3-million. In July of last year, Hawaii got its first steel plant, Hawaiian Western Steel, Ltd. and began production of ingots from locally obtained scrap metal.

Bauxite research continued on Kauai, Maui and Hawaii samples at Rolla, Mo. and the USGS continued its test drilling on Maui.

## IDAHO

**E. F. Cook, director of the Idaho bureau of mines and geology, told a meeting of the North Idaho Chamber of Commerce in Salmon,** that a record of $16-million worth of silver should be dug from mines of Idaho during 1961 and he told the group that silver has now become Idaho's leading mineral commodity. He said the record output should result from increased production at the Lucky Friday mine near Mullan, and the resumption of full scale operations at the Bunker Hill in Kellogg and the Galena mine of the American Smelting and Refining Co., both of which were idled for eight months by a Mine-Mill union strike in


O-B Designs for Mining Men:

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1960. He also said that if a silver price rise occurs this year, substantial tonnages of silver-bearing rock, now by-passed, can be mined profitably. Idaho's silver production in 1960 was $11.8-million, followed by phosphate rock at $9.8-million, zinc at $9.6-million and lead at $9.5-million, Cook said.

**Two Central Idaho mining organizations** — Prospectors and Miners, Inc., of Grangeville, and Mining & Resources Assn., Inc. of Lewiston, have been merged, with Ernest Butler, Culdesac, as president. Herman Dobroth and George Denison, Grangeville, president and secretary, respectively, of Prospectors and Miners, Inc., have been added to the board of the merged organization.

**Production of mines of the Wallace-Kellogg-Mullan section of Idaho was below the million-ton mark** in 1960 for the first time in 15 years and the gross value of the metal produced was also at the lowest level since 1946, a compilation of annual net profit statements filed with the county assessor at Wallace reveals. Strikes which idled several major producers for eight months in 1960, plus depressed metal prices that have forced several smaller producers to discontinue operations, are blamed for the slump. The district's total output was 974,814 tons compared with 1,262,620 tons in 1959 and 1,960,892 in the district's all-time high year of 1951. The gross value of the output in 1960 was $30,653,391 compared with $37,452,821 for the preceding year and $59,663,890 in 1951, the reports show.

Despite the lengthy work stoppage at the Bunker Hill company's Bunker mine in Kellogg, that company again led in production with an output of 244,898 tons from its Star mine in Burke and 176,462 from the Bunker mine.

## MICHIGAN

**The shaft on White Pine Copper Company's Southwest property is now down over 600 ft** and is expected to reach the ore body, 2000 ft below the surface, in October. Boland Development Co., Ltd. of Canada, has a contract for sinking the shaft to 2250 ft. The 20 ft diameter shaft will be used to drive development drifts, samples from which will be sent to the present concentration plant for analysis and classification. When the company has determined that the ore can be successfully treated, development from this shaft will be continued while a second shaft, for production hoisting, is being sunk. If all proceeds on schedule, the second shaft will be ready in 1964. At present the White Pine underground mine is producing 15,700 tons of crude, low grade copper ore a day, with a copper recovery of 85%.

**Pickands Mather Co. has announced that the closing on April 30** of the Sunday Lake underground mine at Wakefield on the Gogebic range will be permanent. Pumping will be continued until the legal termination of the lease is effective. PM&Co. took over the mine in 1900, 15 years after its opening. Since its opening it has shipped a total of almost 21-million tons; but the ore remaining in the mine, they explain, is of too low a grade to meet present competition at the high mining cost of underground ore. The mine's record shipment was in 1943: 615,682 tons.

**The Calumet Division of Calumet & Hecla, Inc., from its six active shafts** and the reclamation from old tailings in Torch Lake, is producing and refining copper at about its 1960 rate when 53,296,407 lb was produced from all sources.

**The Michigan Geological Survey estimates that there are 124,079,262 tons of iron ore remaining in the state.** Marquette County (Marquette range) has the largest tonnage: 54,001,366 tons; Iron County (Menominee range) has 52,166,834 tons, and Gogebic County (the Michigan portion of the Gogebic range, which also extends into Wisconsin) 17,911,062 tons.

**The Quincy mine smelter at Hancock,** closed for a time to permit accumulation of concentrates from the mine's reclamation plant, resumed operating on June 5th.

**The Champion underground copper mine of Copper Range Co.,** which had been idle for three months, has resumed operations with about 100 men recalled to work. Norman Rivard, former chief engineer for Copper Range at Painsdale, has been named mine superintendent.


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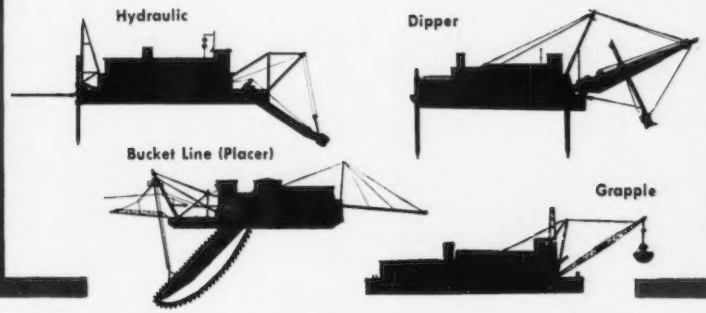


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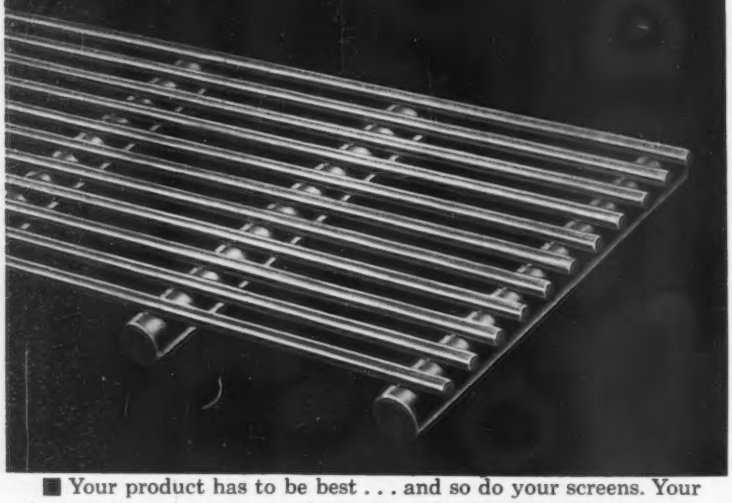

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## MINNESOTA

**The Corsica open pit mine, closed in 1954, is now being operated by the Lake Mining Co.** in connection with the Embarrass open pit, with PM&Co. operating agent at both properties. The washing plant and mining equipment are being repaired, wet screening facilities are being installed, and tailings basin dikes are being raised. When shipping is resumed a higher grade product will be obtained and coarse and fine sizes will be shipped separately. Estimated ore remaining in the pit is about 1.7-million tons.

**The Zenith underground mine at Ely on the Vermilion range, closed since March 4, was reopened June 26** on a five-day week — 210 men returned to work. Announcement was made June 13 by Warren S. Moore, Duluth, president of the W. S. Moore Co., and Robert Archibald, Negaunee, Mich., executive vice-president of North Range Mining Co. which jointly lease the property. They said the reopening was possible because of an improvement in the outlook for iron ore sales and by concessions from the fee owners which include U.S. Steel Corp. and Pickands Mather & Co.

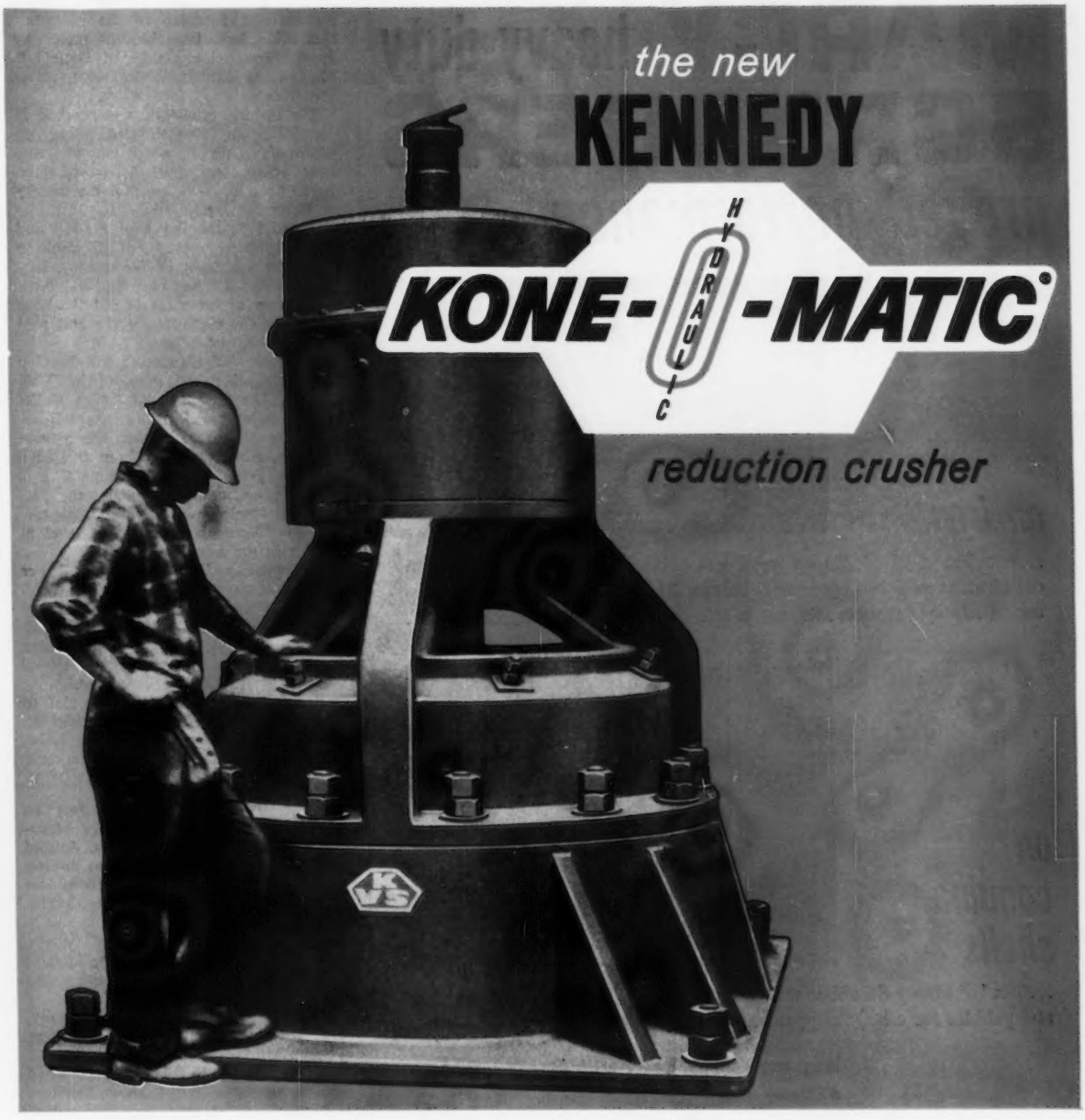
**Iron ore shipments from upper Great Lakes ports for May were 5,236,532 tons**—down more than 7-million tons from May of 1960, as reported by the American Iron Ore Association. Total for the 1961 season through May was 5,450,014 tons compared to 18,151,138 tons for 1960.

**On June 23, Norwood P. Melcher, director of the Minnesota Bureau of Mines Research Center, told a U. S. Senate Interim sub-committee, headed by Sen. John Carroll of Colorado,** that the center is "working full speed" on the development of taconite improvement methods. Asked by Sen. Carroll whether increased importation of Canadian ore might "put a blanket on taconite research", he said, "No, the steel companies will need a greater production in the future." Sen. Carroll was also interested in the M. A. Hanna Co. semi-taconite plant at Cooley, Minn.

**W. S. Moore Co., Duluth, has taken over the lease of the Scranton open pit mine** at Hibbing recently given up by Pickands Mather & Co. The mine still contains nearly 1.5-million tons of ore. While tests made by the W. S. Moore Co. on Scranton mine ore were satisfactory, there are no immediate plans for operating the Scranton. The mine is being maintained. The company's plant at Gilbert is presently treating ore from the Mariska open pit mine at Gilbert and the Judson pit near Buhl. In 1960 the Mariska shipped 157,191 tons and the Judson 66,275 tons.

## MONTANA

**Butte now has a mine one mile deep.** Since last July, shaft sinking crews of the Anaconda Co., under direction of John Suttie, superintendent, and Morton

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- **Tramp iron is automatically released and *KONE-O-MATIC* is back to its setting *fast*, with no strain, shock, bump or damage!**
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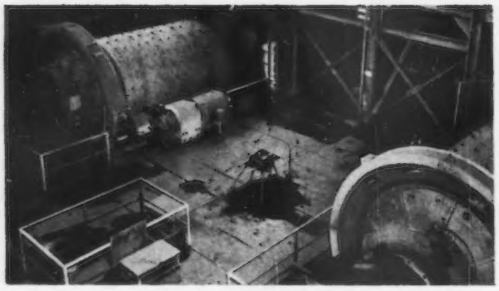
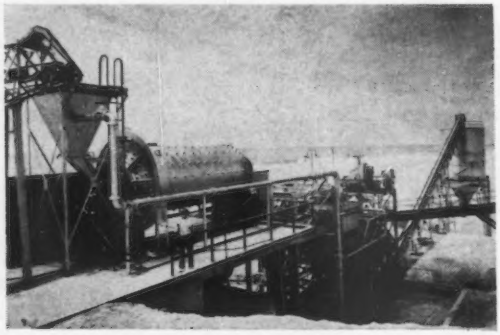


## on iron

...two 9½′ x 19½′ Marcy Scrubbers successfully handle tough iron ore cleaning problem on Mesabi Range. This installation resulted from use of Marcy Scrubbers in two of the company's other concentrators.



## on coquina shells

...7′ x 16′ Marcy Scrubber washes a minus 10″ feed of coquina shells and pebbles for a large copper company in Peru.

### Why you can cut costs with Marcy Scrubbers

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LaTourrette, foreman of the Mountain Con mine, have been blasting their way down through the granite of Butte hill. They have extended the shaft about 330 ft from 4950 to 5280 ft.

The historic milestone was reached in the Mountain Consolidated mine on Wednesday, July 12 which was 97 years after prospectors first discovered gold there. This is the deepest in the history of Butte mining.

On July 11 the day shift blasted and the night shift mucked out the rock so that by the morning of Wednesday, July 12 the mile mark had been reached. Now the bottom of the mine is 801 ft above sea level. The elevation of the collar of the shaft on surface is 6081 ft.

The present shaft sinking for the Con calls for another 20 ft-down to the 5300-ft level. The Steward and Kelley shafts are also being extended but they will not equal the Mountain Con in the present program. Actual mining from the 5200 and 5300 levels in the Mountain Con is several years in the future but the preliminary development work will be carried on. The deepest producing level at present in the mine is 4600 ft.

Before mining begins on the new lower levels, it will be necessary to make a number of costly installations, company officials said. These will include facilities for pumping water, ventilation etc.

Ground temperature on the 5200 level is about 140°. Air will be cooled.

The shaft which has been extended to a full mile is a timbered shaft, 20x8 ft. It has four compartments, two for hoisting ore, one for pump lines, etc., and one for men and service.

**Department of the Interior on July 14 advised Montana Senators Mike Mansfield and Lee Metcalf and Rep. Arnold Oslen at Washington of plans to dispose of or convert about 351,000 tons of low grade manganese ore** at Butte and Philipsburg.

The Butte ore is stockpiled at the Domestic Manganese and Development Co., 1345 So. Montana, a smelting and refining concern.

John Cole, president of the company, said when told of the message from Washington:

"I haven't received any direct word from Washington but I know Senators Mansfield and Metcalf and Rep. Olsen have done a lot of work on this thing".

Changes sought by the two Senators would have had the effect of eliminating uncertainties and removing limiting language which might have excluded Butte from benefits.

"The plan proposes disposal of low grade ore, consisting of 215,285 tons of oxide and 123,425 tons of carbonate ore located at Butte, and 12,798 tons of carbonate ore located at Philipsburg.

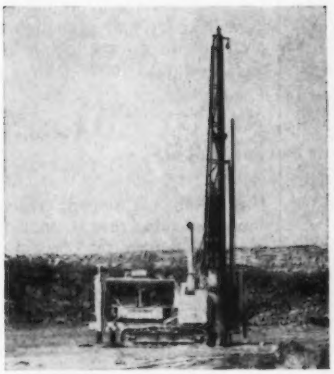
"The entire lot is believed to be equivalent in recoverable manganese to 135,000 tons of specification ore.

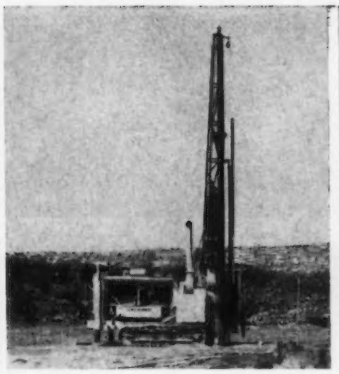
"The Department also proposes to consider offers to convert the ore into specification grade silico-manganese.

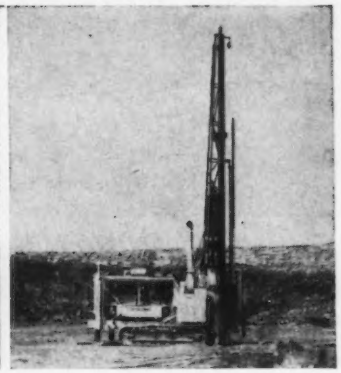
"Of the expected 80,000 tons of silico-manganese to be derived, 65,000 tons would be returned to stockpile and the remainder applied toward payment in kind for processing.

**FORMULA FOR PROFIT:**

# 3 x = 17







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**Stearns In-Line automatic self-cleaning suspended tramp iron separator angled over the head pulley of a fast moving coal conveyor.**

**In-Line and Cross-Belt Self-Cleaning Styles or Rectangular Unit Only Available in a Wide Variety of Field Strengths for Belt Widths to 60 inches.**

Stearns oil-filled suspended magnets have been *job-proved* in scores of tramp iron separation applications in foundries and for crusher and pulverizer protection in power installations, coal, metallic, nonmetallic and slag processing plants throughout the world.

Now Stearns has extended the benefits of these powerful tramp iron separators to meet the requirements of practically any application.

Stearns' broad application-engineering experience, coupled with the latest in separator design features, can provide the protection you need at real value prices.

**CHECK THESE STEARNS VALUE-FEATURES BEFORE BUYING**

**1. Space-wound construction provides maximum oil flow for coolest operation, highest efficiency.**

**2. Oversized coil core cross section for most efficient use of ampere-turns means greater strength, lower power consumption, smaller over-all size.**

**3. Top-grade transformer oil with oxidation inhibitor.**

**4. Pressure-sealed, high-voltage-range terminals and oil-tight, completely enclosed junction box provide maximum lead protection.**

**5. Machine-welded outer case and expansion tank protected by relief valve.**

**6. All units subjected to full-power, 24-hour factory test.**

In addition, In-Line and Cross-Belt Self-Cleaning Units also feature:

1. *Extra non-magnetic bottom wear plate to protect coil enclosure*
2. *Lifetime-lubricated pulley bearings*
3. *Motor-gear reducer chain drive*
4. *Heavy-duty belt styles to match the job*

* Let us prove it . . . call in one of our engineers today for a job-studied recommendation and price quotation. Ask for new Bulletin 1032D.

DIVISION OF INDIANA GENERAL CORPORATION

**STEARNS MAGNETIC PRODUCTS**

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*Profit with Stearns — First with Ceramic Magnet Separators for Industry*


**American Chrome Co. confirmed June 23 it is working hard to get Congressional approval of legislation to provide upgrading of chromite at Nye.**

William Groody, company treasurer at Nye, said that present average of 420 tons daily means that the contract (for stockpiling 900,000 tons of chromite in eight years or less) will be fulfilled by mid-October, about 2½ months ahead of the Dec. 31 expiration date. The company was organized by Consolidated Goldfield for the Ney mining operation, and work was started Aug. 10, 1953.

For nearly two years American Chrome has been making regular shipments of ferrochrome for domestic steel industry use east of the Mississippi River from a semi-commercial plant which produces about 15 tpd of ferrochrome.

The pilot plant is not profitable but with a quaranteed market American Chrome would construct a smelter which could be profitable, Groody said June 24. He declined to estimate size of market necessary for a profitable operation.

"We aren't selling enough to make a profit if we do not get help from the government," Groody said.

## NEVADA

**Howe Sound Company reported at its annual meeting that its manganese mine near Henderson in Clark County, will be closed during 1961,** and that the firm's plant at Henderson which has been treating the manganese ore, will be liquidated. The decision was announced following the Government's decision to cut down its manganese purchases. Other manganese mines and mills in the Henderson area are also slated to close during the next few months.

**White Caps Gold Mining Co. has struck an unexpected orebody** as a result of diamond drilling operations from the 1200-ft level of its mine at Manhattan in Nye County. Three core samples ran from 1.10 to 2.4 oz of gold per ton, and assays indicated values of $42, $38.50 and $84 per ton. The ore is reported to have good depth. The White Caps Co. is also operating the True Blue Mine near Austin and is sacking high grade ore awaiting completion of roads now being built to the property.

**Fire destroyed the power house at the Tonopah King mine** two miles north of Tonopah in June. The blaze, of undetermined origin, destroyed the diesel generating unit which supplied power for the four-man crew which had been employed at the property. The Tonopah King is leased by the U. S. Milling & Minerals Corp. of Silver Peak, and has been producing a steady output of good silver ore which has been shipped to the company's mill at Silver Peak. Operations will be resumed as soon as the fire damage can be repaired. Jesus Martinez, of Tonopah is mine superintendent.

**W. H. Wathen and Archie Branch, of Camino, Calif., have moved a shovel, bulldozers and other equipment** to their

# NACO ALLOY BALLS

*through closer metallurgical control*

| Distance from surface—inches | ROCKWELL | BRINELL |
|---|---|---|
| 1½ | 63 | 710 |
| 1⅛ | 61 | 670 |
| ¾ | 59 | 638 |
| ⅜ | 57 | 601 |
| | 55 | 555 |
| | 53 | 534 |
| | 51 | 495 |
| | 49 | 477 |
| | 47 | 444 |
| | 45 | 429 |

*tumble per-ton grinding* *costs*

Through precise laboratory controls of the elements in steel making — from spectrographic analysis through final heat treating — Naco Grinding Balls possess the correct structure and hardness for maximum impact absorption and wearing qualities. Structurally, Naco Grinding Balls have a grain akin to tool steel — tough, hard and rugged. Laboratory tests show remarkable uniformity in solidity and controlled hardness holding to desired depth. Every day more mill operators are tumbling to the cost-saving advantages of Naco Grinding Balls.

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POST OFFICE BOX 750
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**NATIONAL CASTINGS COMPANY**

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Western Rock Bit design precludes the reverse taper dullness common to conventional bits and gives an effective drilling life, lasting far beyond the point where conventional bits must be withdrawn from service for resharpening.

**Western Rock Bit's exclusive design accomplishes great drilling economies**

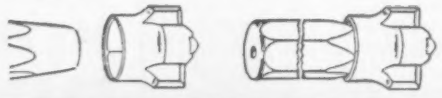
**fast drilling-long life**
**low first cost-low cost**
**per foot of hole drilled**

***FORGED FOR TOUGHNESS FROM NICKEL ALLOY STEEL***

An exclusive process extrudes the steel under pressure in a manner that preserves the important grain of the steel and imparts unusual strength to the bit body.

**Strong Superior Connection**

**tapered socket — no threads**



**WESTERN ROCK BIT**
*Manufacturing Company*
552 West 7th South . Salt Lake City 1, Utah

gold mining claims in Limerick Canyon, Pershing County. The two men made a promising strike on the property late in 1960, and are planning to carry out a full-scale development program.

**Congden & Carey Ltd. filed 35 claim notices and seven certificates of location early in June on property adjacent to a large number of claims held by Columbia Iron Mining Co.** in Pumpkin Hollow, Lyon County. The notices were filed in the recorder's office in Yerington along with a certificate of limited partnership which lists Thomas E. Congden, of Denver, and William J. Carey, of Dallas, as general partners. Interest in the Pumpkin Hollow area was aroused during 1960 when Columbia Iron Mining Co. carried out an extensive drilling program for United States Steel Co. in the vicinity. An extensive supply of magnetite was found underlying the area.

**Standard Slag Co. is producing an average of 25 carloads of iron ore per day** from the Minnesota Iron Mine 16 miles northwest of Yerington. The ore is upgraded in the company's magnetic separation plant, and 47 men are employed in the mining and milling operation. Ore is loaded on cars at Wabuska. The property is the only operating mine in Douglas County.

## OREGON

**Rare Metals Corporation has leased the Hulin quicksilver claims** adjacent to Cave creek in the Burnt River area of Baker County. Company geologists have done some preliminary exploratory work.

**Bill Wood and Bill Close have moved a** drag line to the O'Brien Creek placer in the Eagle Creek area in Baker County to continue test work.

**J. E. Fitzpatrick and J. E. Inman have about completed hydraulic clean-up work** on the Joe-Joe Placer Mine on Upper Coyote Creek in Josephine County. An estimated 150,000 cubic yards of gravel was worked through the sluice boxes in 3½ months of winter and spring operation.

**Roy Houck & Sons Corp., a highway construction contracting firm, got a little extra profit from gold** on a contract near Gold Hill. Dredge tailings were crushed and screened for construction gravel and a gold-saving circuit was set up. Concentrates are recovered from the minus ¼-in. material by means of undercurrents and a pair of Clark Bowl concentrators. Gold was recovered from the concentrates by the Zinc Creek Mining Co. mill located in the Illinois Valley between Cave Junction and O'Brien.

## TENNESSEE

**Hooker Chemical Corp. of New York has purchased the old TVA plant** and equipment at Godwin and other properties from International Minerals & Chemical Corp.

# TRAYLOR FIRST

## Biggest primary gyratory crusher in 1919 and now . . . big reason why it pays to plan with Traylor in the changing 60's

Industry seeking a crusher of capacity bigger-than-ever turned to Traylor and got it . . . 42 years ago. The 60-inch primary gyratory first built by Traylor then is still in operation—along with two others purchased since by the same customer. It is still the standard by which "big" crushers are measured.

Why so important now? One obvious reason is, no one has a longer record of experience in this special field.

Of even greater importance: It's one of many important demonstrations of Traylor's being first with new and better equipment to meet changing production needs. You'll find many other examples throughout the industry—very likely right in your own plant. Do you use an all-welded kiln . . . a large ball mill, larger copper converter? All these are Traylor "firsts," too. Traylor's proved capacity to pioneer sound innovations in kilns, mills and crushers is enhanced today by expanded research capabilities and process know-how.

An impressive record of historic "first" . . . plus what it takes to stay first for so many years . . . that's why it pays to call on Traylor first when you're planning plant improvements for bigger profits tomorrow.

*See Pit & Quarry Handbook for details and specifications*

Traylor — Fuller Company, General

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## Du Pont reports on

# a new type of conveyor belt carcass

## that sets new standards of performance

### Made with load-bearing components of DACRON® fiber, it resists deterioration better, carries more, cuts handling costs

Today, a new type of conveyor belting offers you cost-saving performance on the toughest jobs in industry. The reason is a fabric carcass made with strong reinforcements of "Dacron"* polyester fiber running the length of the belt.

**Superior resistance to deterioration**—"Dacron" is not affected by rot and mildew, so these belts do not have problems with moisture in cover cuts, or when fabric is exposed in the splice area. "Dacron" also withstands belt-fastener rust and most chemicals to assure long service under tough, wet or dry operating conditions.

**Improved durability**—Impact resistance is excellent. The high strength of "Dacron" teams up with the strength and elasticity of nylon, the cross fiber, to sustain shock loads. "Dacron" resists stretch. This means lower growth of the belt in service—fewer take-ups.

**Better flexing and troughing**—Because of this high-strength carcass made with "Dacron", these belts can be thinner, permitting the use of smaller-diameter pulleys. They are more flexible, train better on idler rolls—resulting in less belt wander and edge wear. These belts have a better resistance to flex failure—an important long-life feature.

Troughing up to 45° is possible, compared to the usual 20°. This means belts can be narrower and lighter—and still carry larger loads. The result is reduced handling costs right down the line!

**More for your belt dollar**—It all adds up to superior performance and the economy of long service with fewer belt replacements, less down-time, lower maintenance costs. Make sure you ask about conveyor belts made with "Dacron" polyester fiber next time you order—get the most for your belt dollar!

E. I. du Pont de Nemours & Co. (Inc.), Textile Fibers Dept., 191 South Main St., Akron 8, Ohio.

*Du Pont's registered trademark for its polyester fiber.

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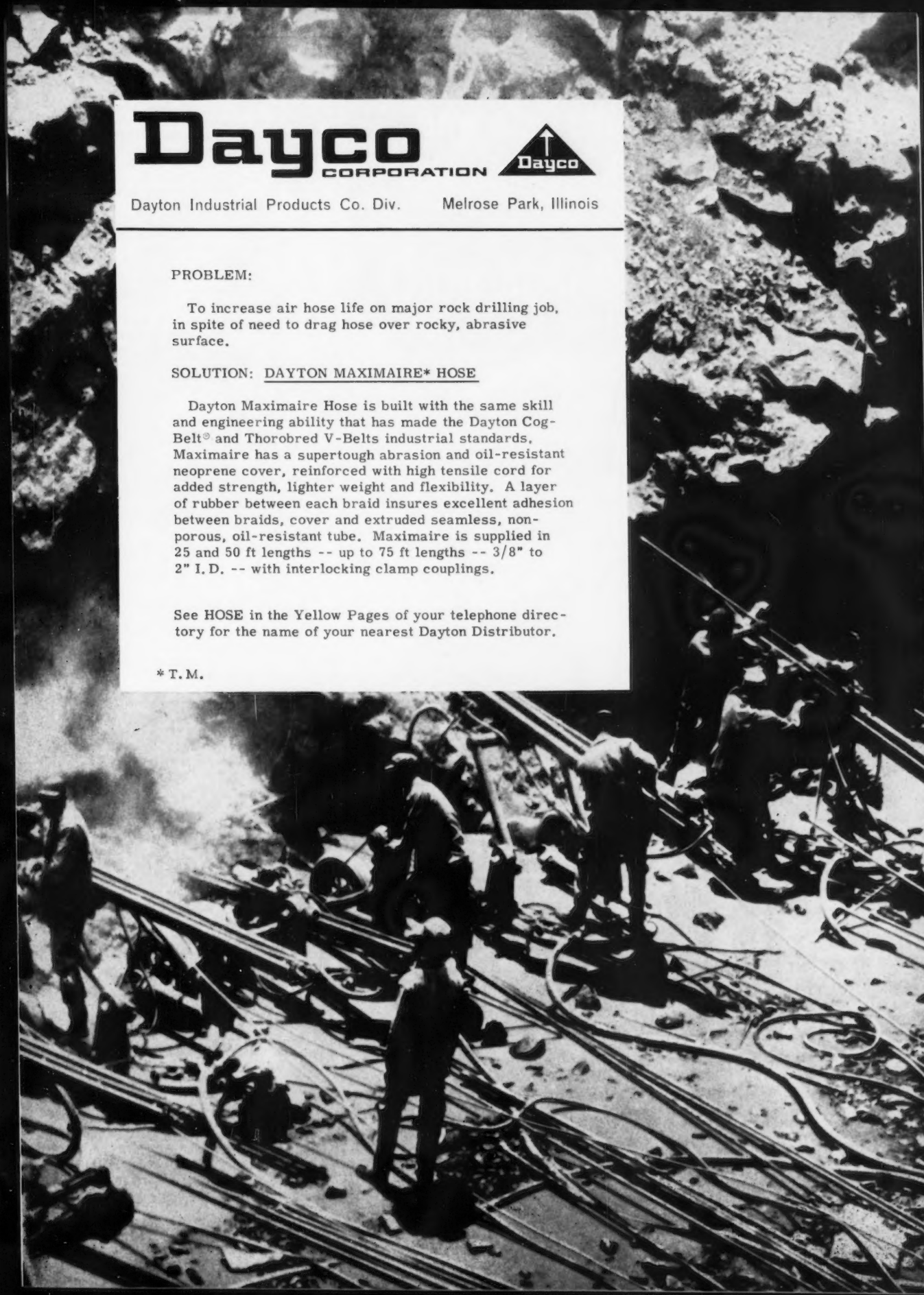
*the conveyor belt fiber*



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PROBLEM:

To increase air hose life on major rock drilling job, in spite of need to drag hose over rocky, abrasive surface.

SOLUTION: DAYTON MAXIMAIRE* HOSE

Dayton Maximaire Hose is built with the same skill and engineering ability that has made the Dayton Cog-Belt® and Thorobred V-Belts industrial standards. Maximaire has a supertough abrasion and oil-resistant neoprene cover, reinforced with high tensile cord for added strength, lighter weight and flexibility. A layer of rubber between each braid insures excellent adhesion between braids, cover and extruded seamless, non-porous, oil-resistant tube. Maximaire is supplied in 25 and 50 ft lengths -- up to 75 ft lengths -- 3/8" to 2" I.D. -- with interlocking clamp couplings.

See HOSE in the Yellow Pages of your telephone directory for the name of your nearest Dayton Distributor.

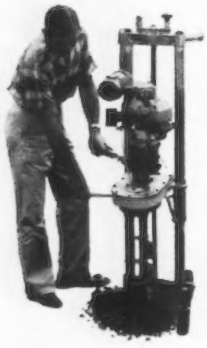
* T.M.

the man who backs his skill *with* Mobile Drill

is MOBILEized for *bigger profits!*

Mobile Drills are "on the go" everywhere . . . helping contractors prove out profitable jobs and *bid with assurance.* Whatever your drilling specialties, there's a dependable, field-proven Mobile Drill engineered especially for your range of operations. So MOBILEize for a head start on the bidding . . . a head start on *profits.*

Mobile B-52



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Mobile B-40

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## Tennessee *(Continued)*

S. A. Mattison, Hooker Chemical's director of public relations, valued the property at approximately $750,000. He said the properties contain undeveloped phosphate reserves in the area of Maury, Hickman and Lewis Counties.

At the same time, it was announced that Hooker has leased the mineral rights of other undeveloped phosphate reserves from the Phosker Realty Co. The properties are in Ashwood, Darks Mill, Shady Grove and Centerville.

"These transactions are a part of Hooker's expansion for the Columbia plant, which was announced in March 1960," said Mattison. "At that time it was brought out that an additional furnace for reducing phosphate rock and auxiliary equipment for material handling would be installed. Work on these additions is well underway.

## WASHINGTON

**First commercial shipments of tungsten concentrates from the Chief Jo Tungsten, Inc.,** property 25 miles southeast of Okanogan, are expected later this summer.

Fred Timm, president of the firm, said the 50 tpd gravity mill at the property will be in commercial operation by September.

Tungsten was first discovered in 1956 on Timm's 6000-acre ranch along the Columbia River. He said an exploration and development program has disclosed up to 100,000 tons of scheelite tungsten ore at the property.

A crew of eight men are now working at the property and Timm plans to run a two-shift operation to handle 50 tpd of ore and produce 750 lb of concentrates. About two tons of concentrates are now in stockpile from test runs of the mill.

# IN CANADA

## BRITISH COLUMBIA

**Construction of an underground $400,000 ore mill and concentrator** will begin soon at Cowichan Copper Co. Ltd. property at Jordon River on Vancouver Island.

The mill will be 7,000 ft from the portal of an 8,000-ft tunnel to the orebody.

Concentrates and tailings will be piped to the portal. Concentrates will run in a fluid state and be stockpiled and dried. Tailings will go into the ocean.

The mill is for operation of the Sunloch and Gabbro mines of the Sunro Mining Co., owned by and leased from Consolidated Smelters.

Cowichan has an agreement with the Mitsui Company of Japan who will finance the new mill and buy concentrates on a renewable 10-year contract. Gross purchase may run to $19-million in the 10 years.

# TURNKEY

## The design and construction approach that can cut time and costs on your new plant—and KE is a master at it!

*Turnkey* means that one, universally-competent architect-engineer-construction firm takes your new plant or expansion project, from initial concept to start-up—*literally from A to Z!* Project phases typically include feasibility studies and site selection, plant concept and preliminary engineering, detail design, procurement, construction, start-up and maintenance. You enjoy the proved efficiencies of single-contract responsibility, and free your own key people from time-consuming attention to the project. In Steel, in Minerals, in Power Generation, in the Nuclear field—Kaiser Engineers' experience in turnkey projects is widely recognized. A call from you will bring a specialist in your industry to summarize how KE has performed for others, can save money and valuble time for you.

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Excessive heat build-up caused by constant flexing — even in environmental temperatures — is the major cause of V-belt deterioration. BOSTRON with Neoprene remedies this problem.

Neoprene withstands heat up to 165°F. (ordinary belts deteriorate at as low as 115°F.), and gives greater resistance to oils, ozone, chemicals, abrasion. This means a high safety margin, long life.

Neoprene with Fiber-Dispersed Stock in BOSTRON'S compression member provides: (1) high cross-wise rigidity, (2) exceptional length-wise flexibility, and (3) extra tensile member support. Fibers are closely packed, in straight lines, and virtually frictionless.

BOSTRON'S Tensile Member, by actual test, gives greater stability, 40% more strength, and is inherently stretch resistant. Moisture gain is only 1/20th that of conventional reinforcing fiber. A special heat and tensioning process for the cords further minimizes stretch. BOSTRON withstands more shock loading, needs less maintenance, and shows minimum growth even after months of operation.

*Inside and out, your best buy is* **BOSTRON V-BELTS** *with* **NEOPRENE**

AMERICAN BILTRITE RUBBER COMPANY
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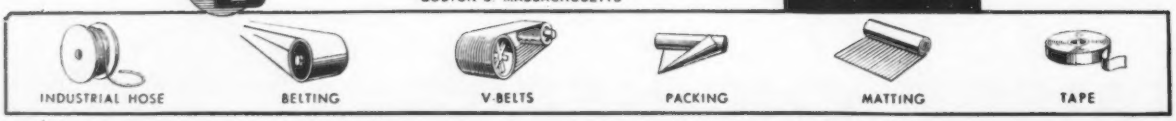
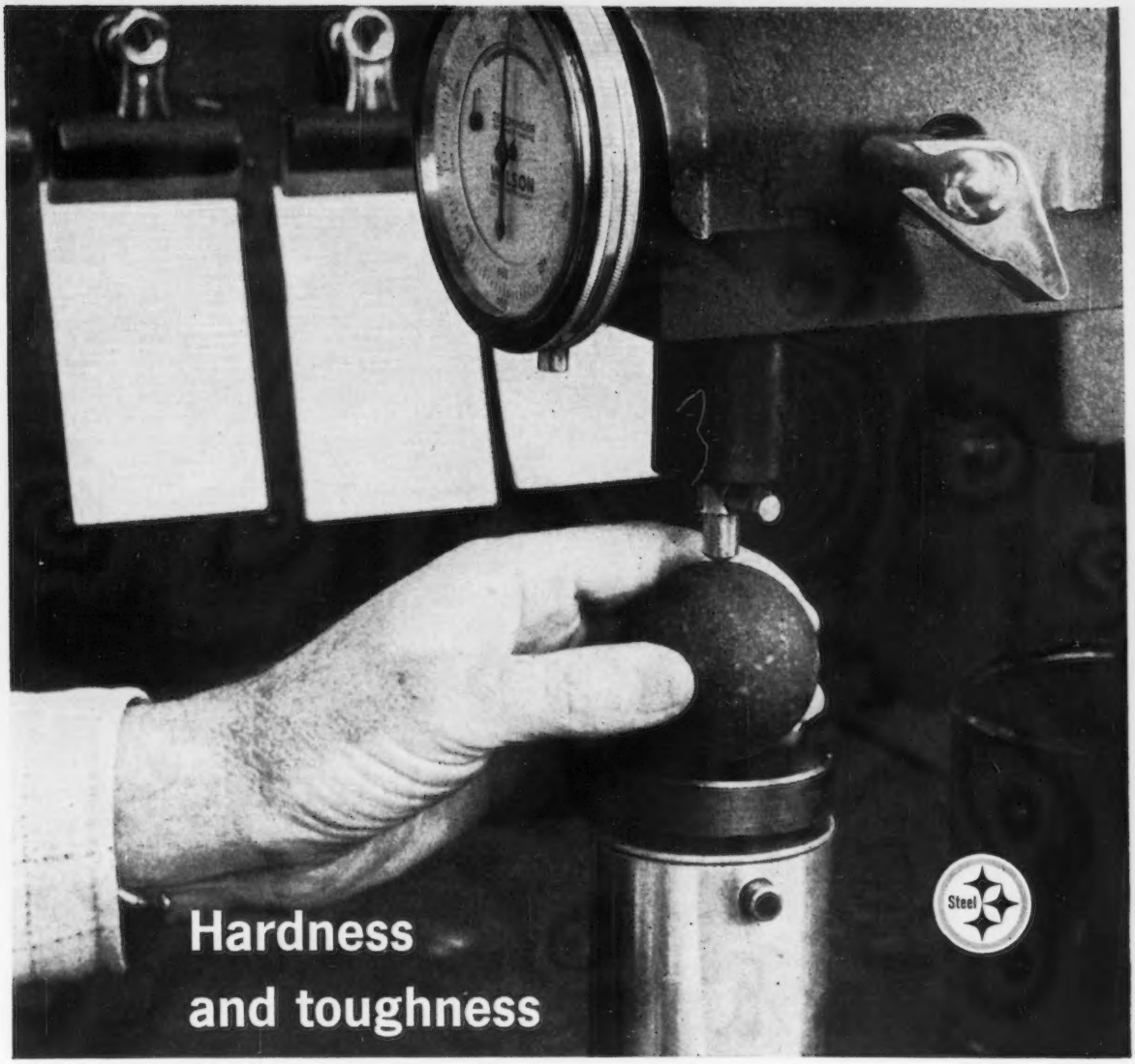
**BOSTON**



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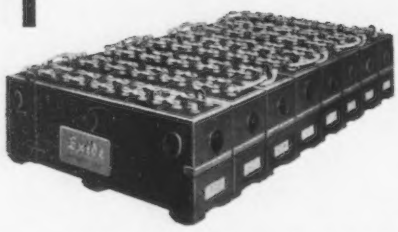
Hard. Tough. Consistently uniform, right down to the core. Those are the qualities that have sold more than a million tons of Sheffield Grinding Balls. They've proved their dependability on every kind of grinding job, all over the world. Moly-Cop Balls keep their sphericity longer, give a better grind at a lower cost per ton. That's because Sheffield alloying, heat-treating and forging are kept consistently uniform, too . . . by constant quality control. **Sheffield Plants: Houston • Kansas City • Tulsa**

**SHEFFIELD MOLY-COP Grinding Balls**

**ARMCO Sheffield Division**

# EXIDE POWER PACKAGE— THE BIG, NEW ECONOMIZER

1



### Low-cost battery power

For any mine locomotive, there is one particular type and size battery that best meets your requirements. And only Exide offers so broad a range of types and sizes. Let your Exide man recommend the one battery that's best for you. The Exide line includes Exide-Ironclad, with new higher capacity and longer life potential; Exide-Powerclad, premium quality flat plate battery; and Exide nickel-iron-alkaline, invented by Thomas A. Edison.

### High-efficiency chargers

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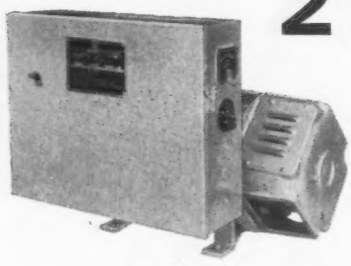


Install high-efficiency Exide chargers with your batteries and save money on your power. Buy your chargers as part of an Exide power package. Your Exide man will recommend the size and type charger that fits your needs exactly. So you get complete charging and don't pay for unneeded capacity. Correct charging rate helps prolong the life of your batteries. Choice of either rotating or rectifier type chargers.

3

### Fast, dependable service

The complete Exide power package is the lowest-cost way of getting the maximum for your battery dollar investment. Exide service men, factory-trained specialists in Exide equipment, will help you attain lowest cost through long service life. Over 200 specialists located from coast to coast available to give you prompt service when you need it.

For complete information on the economies of the Exide power package, write Exide Industrial Marketing Division, The Electric Storage Battery Company, Philadelphia 20, Pa.

Exide® INDUSTRIAL MARKETING DIVISION (ESB)
The Electric Storage Battery Company


## B. C. *(Continued)*

**Influence of the Japanese on B.C.'s mining status continues to grow.** (see p70) Latest development is contained in a statement by Mines Minister Kenneth Kiernan, just returned from a visit to Japan.

He reports that Japanese interests are considering further substantial investments in exploring, mining and processing iron and copper ore in B.C.

Kiernan said Japanese officials will come to the province "in the next few months" to investigate opportunities.

He said the best chances are for exploration investments, a sponge iron processing plant and a copper anode plant.

Availability of great hydro-power resources in B.C. and natural gas at the coast are key factors in Japanese exploitation of B.C. resources, he said.

Meanwhile, Canam Copper Co. Ltd. is negotiating a contract with Mitsui & Co. for purchase of its mine production near Hope. Mitsui is reported to have made a verbal agreement to put up $1,750,000. Lorado Mines, present financial backers of Canam, will put up $500,000 for a mill and machinery and finance the property to production.

Final approval is expected soon.

He suggested that the Japanese set up joint companies to do part of the processing in B.C. and this would enable the Japanese to supply a growing home demand as well as aid B.C. industry.

Cost of electric power for copper processing in B.C. is half that of Japan despite lower labor costs there, he pointed out.

From Bethlehem Copper Corp. Ltd. has come praise for the growing B.C.-Japanese partnership.

Bethlehem is working to bring its Highland Valley property into production and has a 10-year contract to supply concentrates to Japan. The Sumitomo group has made a $5½ million loan. termed by H. H. Huestis, Bethlehem president, as the largest amount of capital ever to leave Japan for a mining venture.

"Sumitomo has also sent outstanding personnel to work with us."

J. A. McLallen, chairman of Bethlehem, said: "The more we become acquainted with our Japanese associates, the more we respect them.

"Their purchases will have a terrific impact on B.C.'s economy."

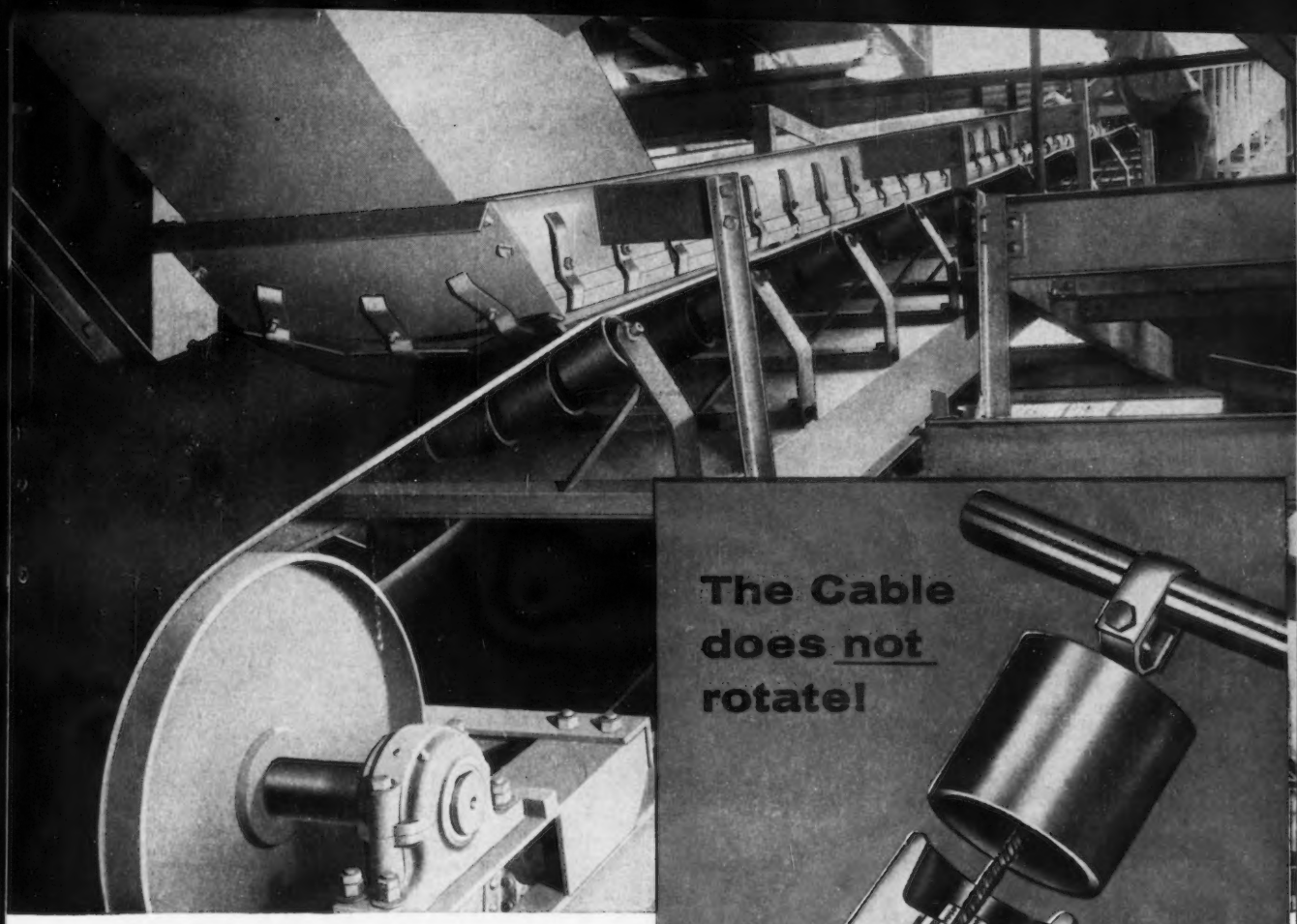
Three top officials of the Sumitomo group were elected to the Bethlehem board.

They are S. Tanaka, president of Sumitomo Metal Mining Co.; K. Matsuda, chief geologist of the same company; and K. Hiraki, senior managing director of Sumitomo Trading Company.

Re-elected were McLallen and Huestis as well as P. M. Reynolds, Donald F. Farris, Marsh A. Cooper of Toronto and Hugh Martin.

Richard F. Dooley of Chicago retired from the board to make way for the Sumitomo members but was appointed honorary vice-president.

The new Ainsworth-Mitsubishi agreement (E&MJ, July, p17) is reported to



The Cable does not rotate!
McNally Pittsburg cradle idler design eliminates twists, harmonics–for only the rollers rotate.

## That's why you get Greater Belt Life... Less Maintenance

McNally Pittsburg conveyor design adds big tonnage to your belts, cuts power costs, spares you many dollars in maintenance time and replacement parts. The secret of these savings lies in the patented cradle idler design. Big 5" rubber rollers are suspended in a true catenary, on flexible, stainless steel wire rope. They follow the belt contour, deliver deep troughing action, extend belt life and cut spillage.

Only the rollers rotate. The wire rope is supported at each end by a simple ball joint. It moves freely, adjusts to any belt contour, and provides uniform belt support without any bends or creases. Since the rope does not rotate with the rollers, harmonics are eliminated. The rollers ride on precision-ground ball bearings, which are prelubricated and sealed for life. And you can replace the rollers one at a time if they wear. Easy to erect and maintain—costs less to operate.

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McNally Pittsburg Manufacturing Corporation—
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☐ Please send information on the new McNally Pittsburg Belt Conveyor.

☐ Have Sales Engineer call for further consultation.

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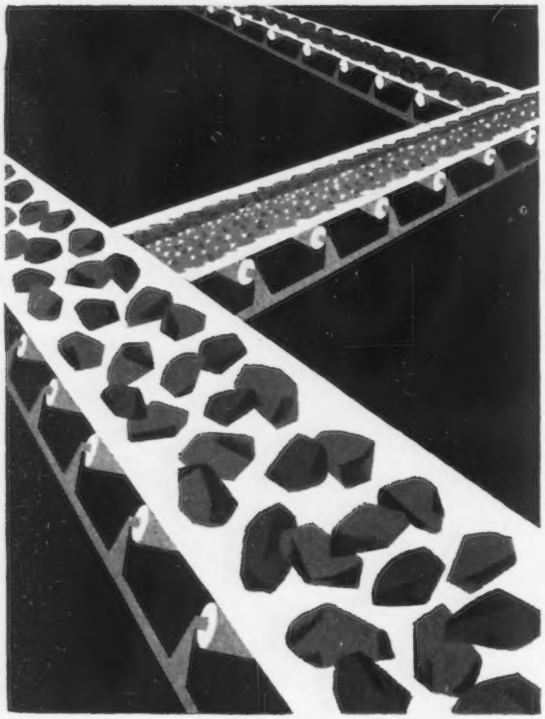

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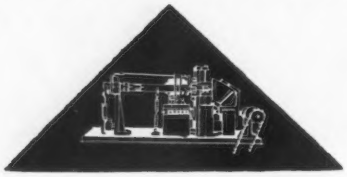
MATERIALS HANDLING

# FAIRBANKS-MORSE BELT CONVEYOR SCALES



Now ore, minerals, concentrates, sludges and other materials can be quickly, easily and accurately weighed while they are passing by on conveyor belts. F-M specially designs belt conveyor scales for your specific needs . . . assuring accuracy and economy for your particular operation.

With F-M Belt Conveyor Scales you get simple and positive operation that automatically totals the weight of the materials carried by the conveyor. The accumulated weight is shown on the direct-reading register . . . there's no need to apply multipliers or conversion factors, and a means to provide a printed weight record is available.

The F-M Belt Conveyor Scale is simple in design and construction. The beam and integrating mechanism are housed in a dust-proof cabinet . . . stainless steel and bronze parts mean minimum maintenance . . . aid in the over-all accuracy of the scale.

To learn how F-M Belt Conveyor Scales can save money for your operation, write: **C. G. Gehringer, Director of Marketing; Scale Division; Fairbanks, Morse & Co.; 100 Electra Lane, East Station; Yonkers, New York.**

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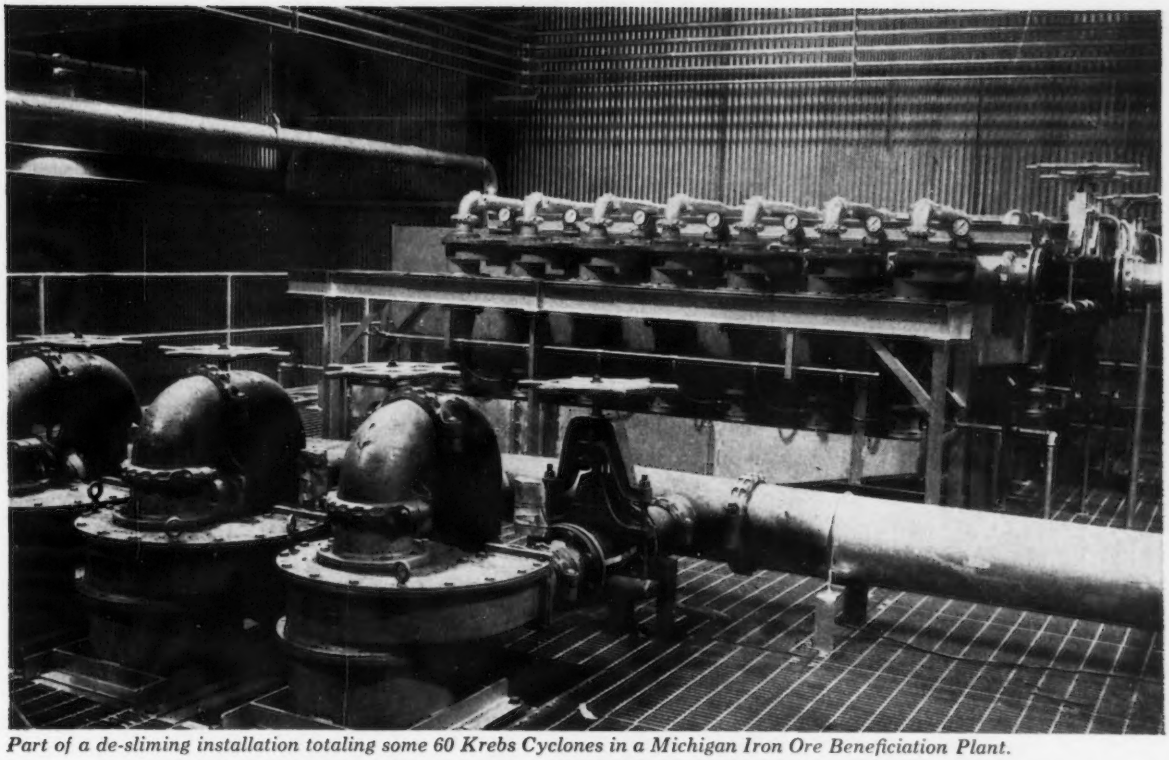


*Part of a de-sliming installation totaling some 60 Krebs Cyclones in a Michigan Iron Ore Beneficiation Plant.*

# Why Krebs Cyclones give you Better Classification, yet cost less

**Greater capacity per unit size** Because the involuted feed entry on a Krebs Cyclone minimizes turbulence and pre-orients particles for efficient classification, a larger vortex finder can be used for a given size cyclone, providing higher capacity and equivalent separation for a given pressure drop. This same design feature can be used advantageously to obtain a finer separation for any equivalent cyclone, orifice combination and pressure drop.

**Greater flexibility** Because Krebs Cyclones are available with the widest variation in orifice sizes, including adjustable apex valves, they can be tailored more carefully to fit the precise requirements of a given job. As a result, Krebs Cyclones not only match capacity requirements with the highest degree of accuracy, but also provide the optimum in fineness and sharpness of separation.

**Greater life expectancy** Because Krebs Cyclones utilize specially compounded, extra-high-density liners, they exhibit extremely good abrasion resistance and outlast vulcanized or low-pressure molded liners many times over. Many main body liners in Krebs Cyclones have been in service for more than 5 years, some having handled in excess of 2 million tons per unit.

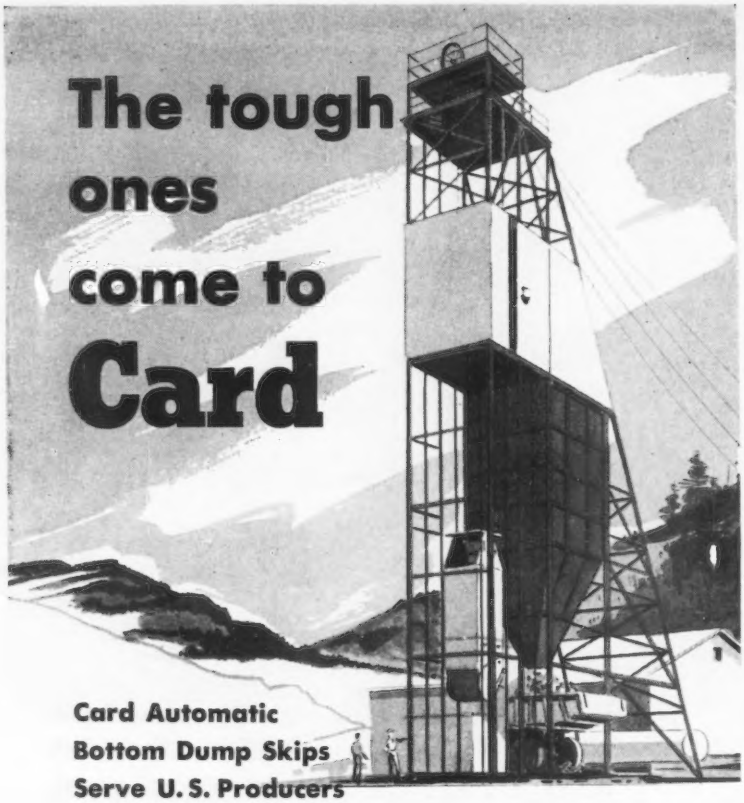
**Because Equipment Engineers Inc. is devoted exclusively to cyclone technology,** you get all the advantages of dealing with a specialist when you specify Krebs Cyclones. Your classification problems are studied by a staff of skilled engineers representing an unmatched accumulation of experience in the design and practical application of cyclones in the metallurgical field.

*A significant factor in the success of every Krebs Cyclone installation is the careful engineering analysis which precedes it. To evaluate your classification needs, we maintain a pilot plant equipped for full-scale testing. From analysis of test results, Equipment Engineers metallurgists are able to predict over-all plant performance with a high degree of accuracy. Your inquiries are invited.*

KREBS

**EQUIPMENT ENGINEERS INC.**
737 Loma Verde Avenue Palo Alto 1, California

*Photo Courtesy of Bechtel Corporation*




**Card Automatic Bottom Dump Skips Serve U. S. Producers in most Major Mining Areas**

This is a progress report on a relatively new idea. Beginning in 1956, increasing demand for the new Card automatic bottom dump skips has gradually brought them into service in a majority of the nation's principal mining areas—from Arizona to the Canadian line. In a typical operation two of these Card skips of approximately 150 cu. ft. capacity each are used to haul ore up a thousand-foot three-compartment shaft at a rate in excess of 900 tons per day.

In the initial year of operation, in one such installation, these automatic skips carried over 270,000 tons of rock before needing attention other than routine maintenance. The same successful design will prove out in your next project. It can be adapted to any capacity and specifications with ease.

Tell us your requirements.

**C.S. Card Iron Works Co.**

2501 WEST 16th AVE.,
DENVER, COLORADO


## B. C. *(Continued)*

be a test and, if plans now being made are completed, a group of small lead and zinc mines will band together to ship larger quantities under a single master contract. An export company is being incorporated for the purpose but so far most commitments are said to be verbal only.

New Ainsworth's ore is being mined in the Black Fox property near Kaslo and will be milled at a nearby custom concentrator. Two shifts are working underground.

Specifications call for a grade of 50% zinc or better in the zinc concentrate and 60% lead or better in the lead-silver concentrate. Deliveries are to be made on the proportion of 60% zinc-concentrate shipments.

Shotaro Yabushita, western manager of Mitsui, told the CIMM that limited domestic resources coupled with continued growth of population and industry necessitates his nation's importing base metal ores and concentrates for a healthy economy.

He expects a 20% increase in demand for lead by 1964.

The present Japanese steel market is brisk and its zinc demands are being met by imports from Australia and Peru.

"But the situation in Australia may be changed in the near future," said Mr. Yabushita. "Our smelters are keenly looking for a substitute source and I would say that Canada could be anticipated by them in that respect."

Yabushita said his company's interest in the mining industry is in three stages:

1. Outright purchase of ore and concentrates from a mine in operation.

2. Financial participation (loan or investment) with a Canadian company for a mine or property going into production.

3. Participation in exploration and development of a new or old property on various basis.

U. S. protests were from management of American Smelting and Refining Co. who say continued Japanese competition could force closure of its Tacoma smelter.

In San Francisco, J. D. McKenzie, chairman and president of Asarco, is reported to have asked the U.S. State Department to try to find a remedy from current Japanese trade missions in Washington.

McKenzie is quoted as saying that Japan imposes a 10% duty on refined copper and strictly limits the amount of refined copper admitted. On the other hand, he said, copper ore and concentrate are admitted free of duty and with no limits on quality.

"Through these arrangements, Japan maintains an internal price for copper averaging 5c a lb above the world price. This amounts to a subsidy advantage of about $100 a ton for Japanese smelters, while the world price is a little more than $600 a ton. Thus they outbid custom smelters of other countries on purchase of raw material."

American Smelting & Refining had its eye on a large source of smelter feed when in 1955, it undertook to finance B.C.'s Bethlehem Copper Corp. to pro-

## USS Grinding Balls are delivered fast!

**No delivery problems.** We don't actually throw grinding balls at our customers—but you can call the shots and we'll ship them fast—all the balls you need, exactly when and where you need them.

**No selection problems.** You can order from a complete stock of USS Carbon-Manganese and USS Alloy Steel Balls, in ten sizes ranging from ¾" to 4".

**No performance problems.** USS Grinding Balls are hard, tough, and uniform from ball to ball and load to load. Recently completed hardness surveys under direction and control of USS Research Center proved that maximum depth of hardness consistent with toughness is provided by our product in both carbon and alloy grades in all sizes. You cannot buy a better ball for your purpose!

Solve your grinding ball wear problem by calling our nearest Sales Office or United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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This mark tells you a product is made of modern, dependable Steel.

United States Steel USS TRADEMARK

THE USEFULNESS OF A LIMA

# Take a good look at this smooth-swinging stripper!

Long casts, full retrieves, bull's eye dumping right on the target zone. That is the kind of routine that pays off in dollars for you. And it is the kind of productive routine that Limas are designed and built to maintain for many years without excessive and costly downtime.

Take this big-bucketed Lima Type 1250-SC Dragline as an example. Here are 8 of the reasons it can add extra profit to your operations:

1. Air-actuated clutches for smooth precision control
2. Main machinery gears of heat-treated alloy steel; teeth machine cut for silent, long-wearing operation
3. Cable drums are extra wide and of large diameter; split removable laggings of various diameters provide variable line speeds
4. Independent 2-drum worm and gear driven boom hoist, automatic holding brake
5. Torque converter for smooth, efficient power increases line pull and productivity—prevents engine stalling
6. Long, wide crawlers for extra stability
7. Cab affords full-vision through safety plate windows
8. External contracting friction band type hoist brakes mechanically operated by pedals and augmented by air boosters

Lima is virtually synonymous with profitable operation everywhere in the world—shovels to 8 yd., cranes to 140 tons, draglines variable. Chances are good that there is a Lima working not far from you. Next time you see one, *take a good look;* watch it operate. If you would like some facts and figures, just ask the Lima distributor nearest you—or write to us here in Lima.

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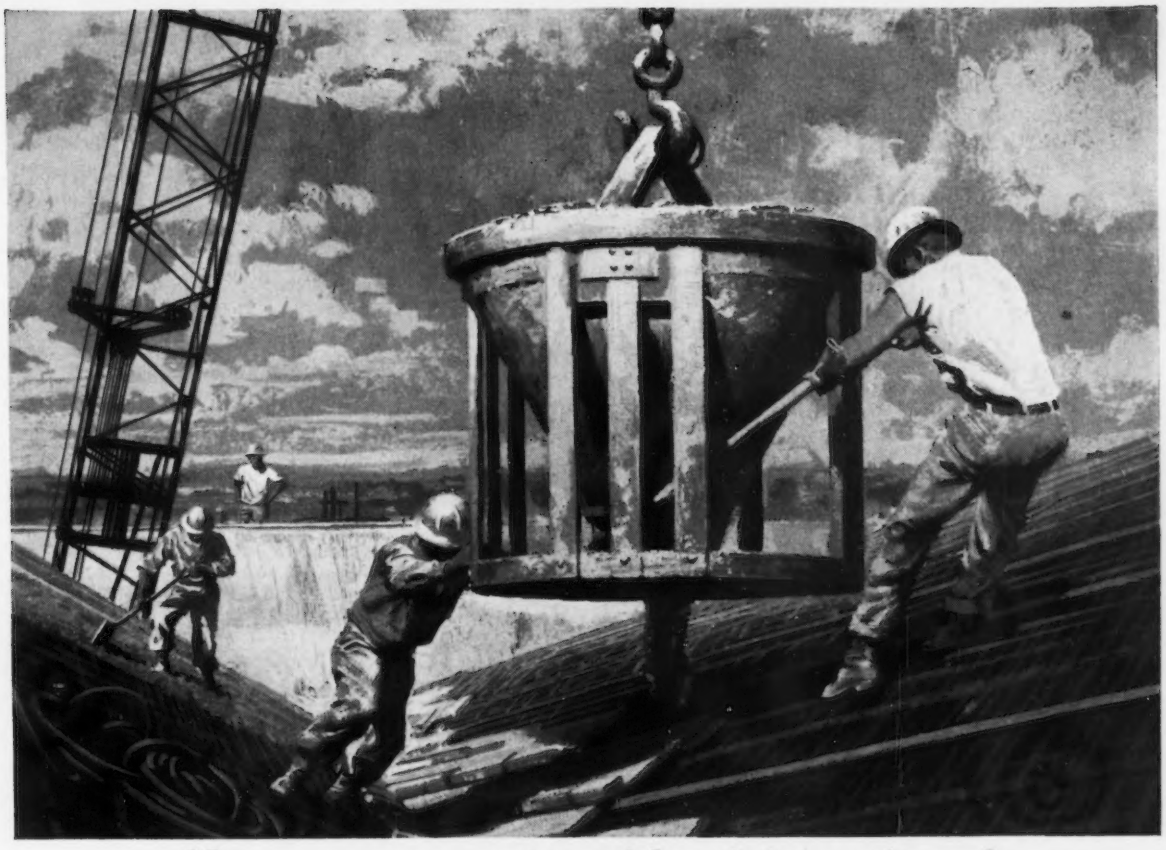

Now a new converter with a 3.6:1 ratio and

# POWER-LOAD-LOWERING SAFETY, TOO

Now, from Allison, comes a converter with new efficiency, new design elements, new low prices that gives you the safety of power-load-lowering and 3.6 to 1 stall-torque ratio too.

It's the new Allison TC-400 TORQMATIC Converter, a breakthrough in converter design from the people who make the world's most complete line of hydraulic drives.

The TC-400 is as new as tomorrow – but incorporates the time-proved TORQMATIC design features which for years have demonstrated their merit on tough job after tough job.

It can handle from 150 to 250 horsepower, is far more efficient than other converters in its range. It's available with a front disconnect clutch, industrial or automotive flange, tailshaft governor and integral charging pump for operating customer transmissions.

And this 3-element converter offers you a choice of 3 different stall-torque multiplication ratios–from 2.9 to 3.6 to 1–at no extra cost.

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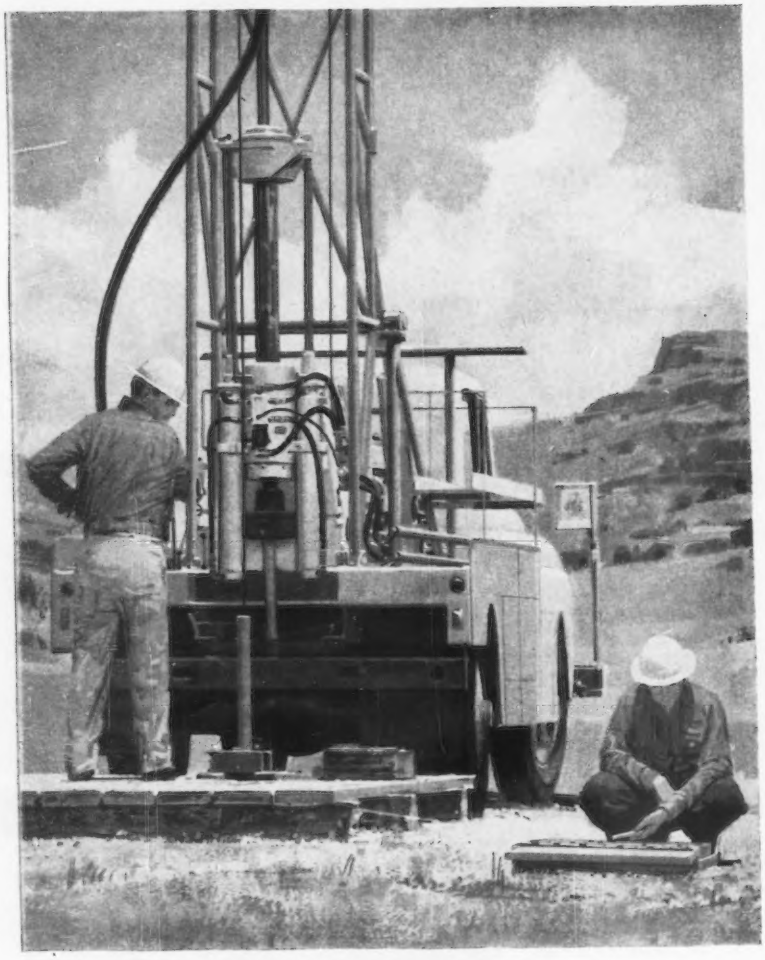
## IT'S A FACT*



***Longyear offers the right combinations to solve your drilling problems...**

When officials of a well-known mining company bought their first string of Longyear Wire Line Coring Equipment, they discovered that (1) diamond bit life *increased* from 300 to 600 ft., (2) core recovery *increased* 35%, (3) progress *jumped* from 30 to 90 ft. per day, (4) overall cost-per-foot *dropped* to one-third of the cost with conventional tools. The right combination of Longyear Equipment *solves core drilling problems* the world over. For complete information, contact our nearest office.

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Tokyo, Japan


## B. C. *(Continued)*

duction. However, it dropped its option in 1958 when it found the costs running high on some of its other commitments around the world.

Since then the Japanese undertook to help Bethlehem finance and obtained a 10-year contract to buy its production.

Currently, Asarco and Japanese are reported to be dickering to buy production from Craigmont Mines Ltd.

**Friday Mines Ltd. has encountered heavy pyrite** at 140 ft on its No. 1 Skarn diamond drill hole at its property north of Keremeos.

The pyrite appeared to average between 7 and 10% and will be assayed for gold and silver.

Meanwhile, three holes are being drilled on the Hedley Monarch section where cores from the first hole showed gold, silver and silica.

**Placer Development Ltd. reports a sharp increase in earnings for fiscal year ending April 30.** Net income is $2,723,214 compared with $1,580,431 the previous year. At its Craigmont Mines property near Merritt, preparation of the mine and construction of a 4,000 tpd concentrator are "progressing favorably."

It is anticipated the property will be in production "by not later than early autumn of this year."

Placer's Mattagami Lake Mines Ltd. is continuing underground development in preparation for production.

**A diamond drill has been flown in to Delhi Pacific Mine 102-claim property** at Theodosia Arm near Powell River, following preliminary assays.

Andrew Robertson, consulting engineer, expects drill results this month.

An iron-copper mineralization zone over a width of 60 feet has been exposed. with subsequent magnetometer work indicating an additional width of 350 feet.

**Silbak Premier Mines Ltd. has made two 51-ton shipments of gold and silver ore** so far this year from its open pit operation at Portland Canal, B.C. and has started diamond drilling to see if there is enough ore to warrant a mill, it was reported at the annual meeting.

The first shipment was made in two parts, one of between five and seven tons assaying 12 oz. gold and 450 oz. silver per ton for a net smelter value of about $800 a ton.

The other part, now at the smelter, had an estimated value of $500 for each of the approximately 45 tons.

The second shipment has an estimated value of $270 a ton.

Diamond drilling in the open pit will determine the extent of the high grade ore found on the surface and the feasibility to refine it on the spot.

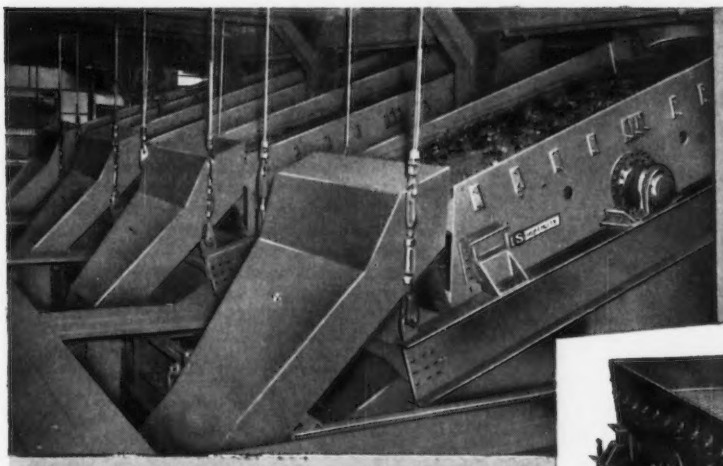
**Reeves MacDonald Mines, Ltd., is building an access road at a lead-zinc property** the company has optioned at Kimberley, near the Consolidated Mining and Smelting Co. of Canada, Ltd., Sullivan mine.

Jens Jensen, Spokane, president of Reeves MacDonald, said the road will

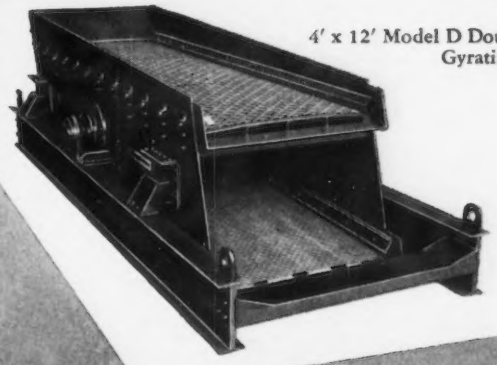
NUMBER ③ IN A SERIES OF FOUR

# BIG CHIEF mine accurately sizes up to 2500 tons of coal per day with SIMPLICITY gyrating screens

At the South-East Coal Company's Big Chief mine in Seco, Kentucky, fast, dependable Simplicity machines turn out 2500 tons of graded coal per day. Five 5′ x 10′ double-deck gyrating screens, four single deck gyrating screens, two Os-A-Veyor Feeders, one Os-A-Veyor Picking Table and four Dewatering Screens (three horizontal, one gyrating) are utilized by the South-East Coal Company to keep production at peak-volume every day. These Simplicity machines have been giving maximum service with low maintenance cost since being installed in 1951.



Material that has been reduced in size by the primary crusher goes to a bank of four 5′ x 10′ Simplicity double-deck gyrating screens. One inch material passes through the top decks and is conveyed to the stoker bin. ⅜″ x 0″ coal passes through the second deck and is conveyed to the carbon bin. Plus 1″ material is retained by the top decks and is routed to a secondary crusher, reduced in size, then conveyed back to the four screens for final sizing.



4′ x 12′ Model D Double-Deck Gyrating Screen

Simplicity Gyrating Screens are mechanical vibrated using counter balanced eccentric shafts. This Counterbalance is machined directly on the shaft and exactly counterbalances weight of entire vibrating screen deck assembly for positive action and perfect smoothness. Sizes of Simplicity Gyrating screens range from 2′ x 3′ single and double to 6′ x 16′ single, double and triple. Catalog #571-581 describes Simplicity screening, feeding and conveyor equipment for foundries, sand and gravel, mining and food processing industries. Write for them today.

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FOR CANADA: Simplicity Materials Handling Limited, Guelph, Ontario.

FOR EXPORT: Brown & Sites, 50 Church Street, New York 7, N. Y.

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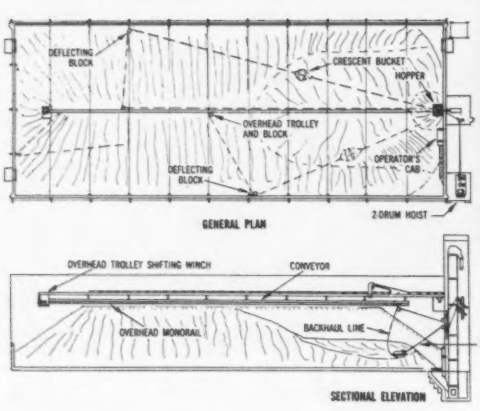
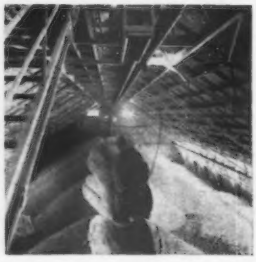
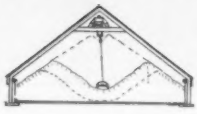
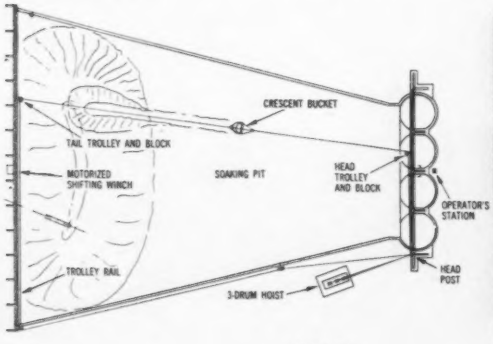
## Sauerman Machines And Methods For Storage And Reclamation

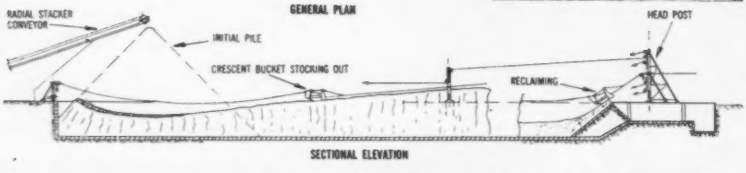




Drawing and photograph illustrate DragScraper Machine using an elevated monorail trolley system along the center line of the storage building for straight-line recovery of bulk material. Overhead trolley and block are controlled by a shifting winch. Recovery is to a hopper located at center of one end wall. Deflecting blocks placed on the side walls permit the bucket to reclaim material from side areas.






Installation drawing shows details of DragScraper Machine handling shale in a soaking pit. Monorail trolleys at each end provide lateral shifting for the Crescent. The third drum on the hoist is used to shift the head end trolley and a motorized winch shifts the tail trolley assembly. The Sauerman stocks out from initial piles, reclaims shale to the wash mills at head end as required. Photo shows Crescent bucket on pile. Shifting winch, trolley rail and conveyor system are in background.

Sauerman Machines stockpile and reclaim bulk materials from buildings, bins and ground storage piles. The Crescent scraper bucket can deliver directly to one or more hoppers at ground level, to conveyors and processing machines or up a ramp to an elevated hopper.

Users of DragScraper Storage Systems find this equipment handles material at less cost per ton than other methods of stockpiling or reclaiming. DragScrapers are economical to operate in limited indoor storage facilities or ground storage areas of several acres or more. Materials handled vary in weight up to 200 lb. per cu. ft. Sauerman Machines are built in sizes from ⅓ to 15 yd. to match your tonnage requirements.

Call or write for recommendations on your material handling job. Catalog E gives specifications and general information.

**SAUERMAN BROS., INC.** 626 SO. 28th AVE. BELLWOOD, ILL.
Linden 4-4892 • Cable CABEX—Bellwood, Illinois

Crescent Scrapers • Slackline and Tautline Cableways • Durolite Blocks


permit drilling equipment to be moved in to sites selected on the basis of airborne and ground magnetometer surveys.

## NEWFOUNDLAND

**T. C. Gorman, a subsidiary of Canadian Dredge & Dock Co., has received a construction contract for 1961 at Advocate mines.**

Karl V. Lindell, board chairman of Canadian Johns-Manville Co., Ltd., and director of Advocate Mines, said Gorman would build a dock with berths for ocean-going vessels and a separate berth for coastal ships; a warehouse with a capacity of 20,000 tons of asbestos fiber; machine shops; and housing, stores and a maintenance garage.

Next year, after the first construction phase is completed, Advocate will issue contracts for the mill and other facilities with the intent that Advocate will be producing asbestos fiber by mid 1963.

# IN LATIN AMERICA

## CHILE

**An organizing committee, headed by Enrique Serrano, Chilean Minister of Mines, has been instituted to proceed with the formation of Gran Mineria S.A.** Its initial activity is to obtain financing for and to exploit and operate the iron ore deposits recently discovered in the Atacama Desert of northern Chile between Vallenar and Copiapo.

These deposits, the Minister of Mines recently announced, were discovered as a result of intense aerial survey.

The minister recently called a meeting of leaders in various productive activities and high legislative and administrative officials of the government to advise them that the Chilean government itself intends to exploit the property through Corfo and that it would not be disposed of by sale, lease or concession to private interests.

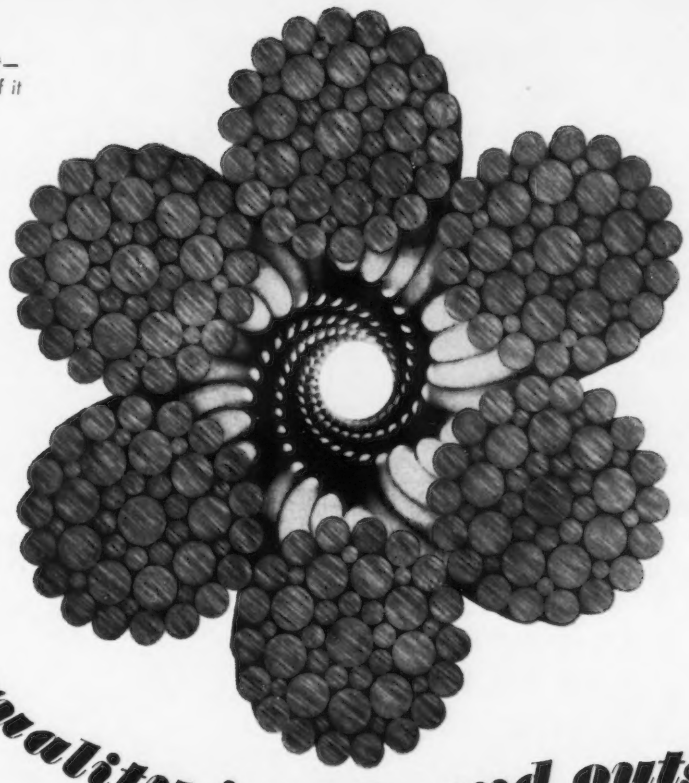
Under a three-year plan, according to the government, it is expected to produce 5-million tons of ore per year.

Señor Serrano said that an appeal would be made to the Chilean people to subscribe voluntarily for the 20-million escudos worth of shares to get the project started. He said that it is confidently expected that organization work would be completed and that the mining project would be well under way during the year 1962.

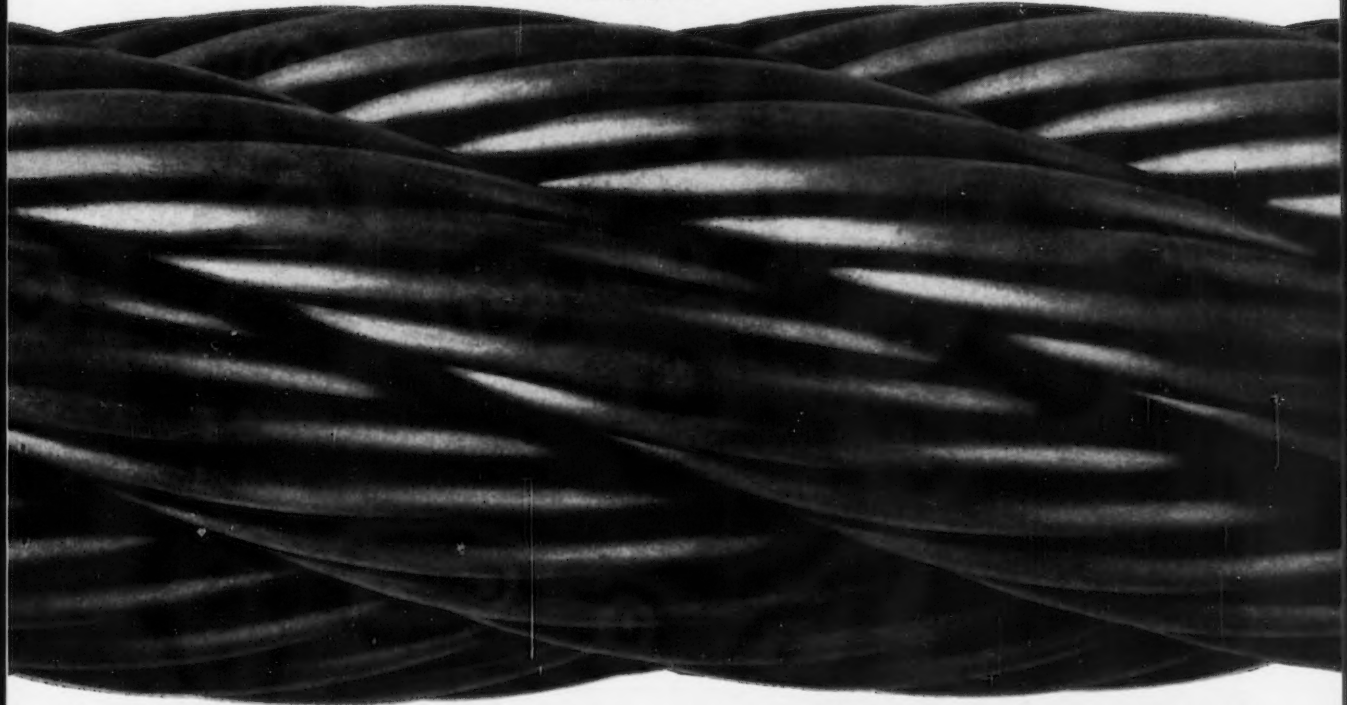
## EL SALVADOR

**The first step toward reviving eastern El Salvador's stricken gold-and-silver-mining industry appeared possible** with

*We put a lot of work into it—*
*You get a lot of work out of it*



# quality inside and outside



Two important angles on wire rope savings: the *quality* and *uniformity* Roebling builds all the way through Royal Blue Wire Rope. They give you a big, extra margin of service through every kind of wear and tear — and combine to make extra strong Roebling Royal Blue the toughest wire rope you can buy. Find out more from your wire rope distributor, or write for free booklet to Roebling's Wire Rope Division, Trenton 2, N. J.

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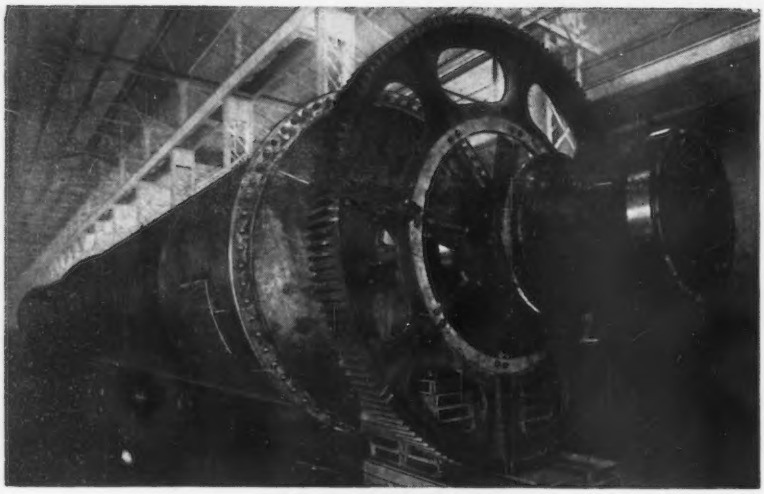


Ruggles-Coles

ROTARY COOLERS IN FOUR TYPES

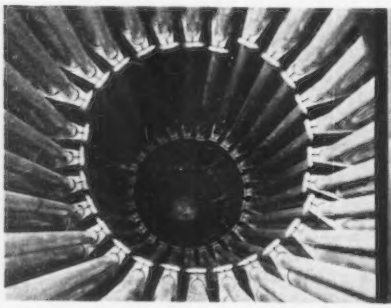
GAS-COOLED TYPE—Solids are cooled by direct contact with cooling air (atmospheric, or dried and refrigerated). Inert gases may be used in a closed system.

WATER-COOLED SHELL—Water is externally applied to the shell, either by sprays or by partially submerging the shell.

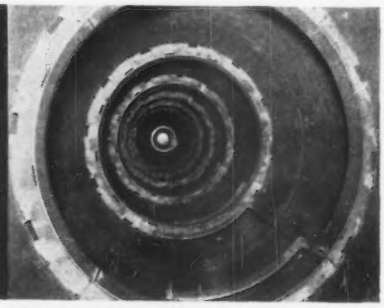
TUBULAR TYPE—Internal water-cooling tubes are assembled with the rotating shell, or installed as a stationary bank of tubes concentric with the shell. Alternately, the water leaving either of these tube sections may be used for supplemental spray cooling on the shell exterior.

DIRECT-CONTACT WATER—For rapid cooling from very high temperatures, water is sprayed directly on the hot material to utilize the latent heat of vaporization. Usually supplemented by secondary air cooling.

Each of these types has a particular area in which it is most economically applied. Write for further information.



Interior of a water-tube cooler. Longitudinal banks of tubes provide maximum cooling surface for minimum floor space.



Interior of partially-submerged cooler with gravity-controlled scrapers maintaining clean shell surface for high-rate heat transfer.

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COMPANY, INCORPORATED

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"Hardinge Equipment—Built Better to Last Longer."

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an official announcement that a Salvadoran investor had been granted permission to exploit the Tepeyac Mine in the Cantón Cañas, in the jurisdiction of Santa Rosa de Lima.

## PERU

**Morrison-Knudsen Co. Inc. will drive** Cerro de Pasco's Graton Tunnel in Peru. The $8.4-million project, consisting of two 10x10-ft, 7-mile-long tunnels, will take about five years to complete. The tunnels — one for drainage, the other for ventilation — will permit Cerro to mine silver, lead and zinc orebodies in the lower part of the Casapalca Mine not now being worked because of underground flooding.

# IN AFRICA

**Compagnie Miniera de l'Ogooue (Comilog) is rushing toward completion** of the 180-mile railway from M'Binda, on the Gabon border to the existing Congo-Ocean Railroad. General Electric rushed shipment of four locomotives to complete its shipment of seven at the request of the mining firm, which will tap a manganese deposit in Gabon.

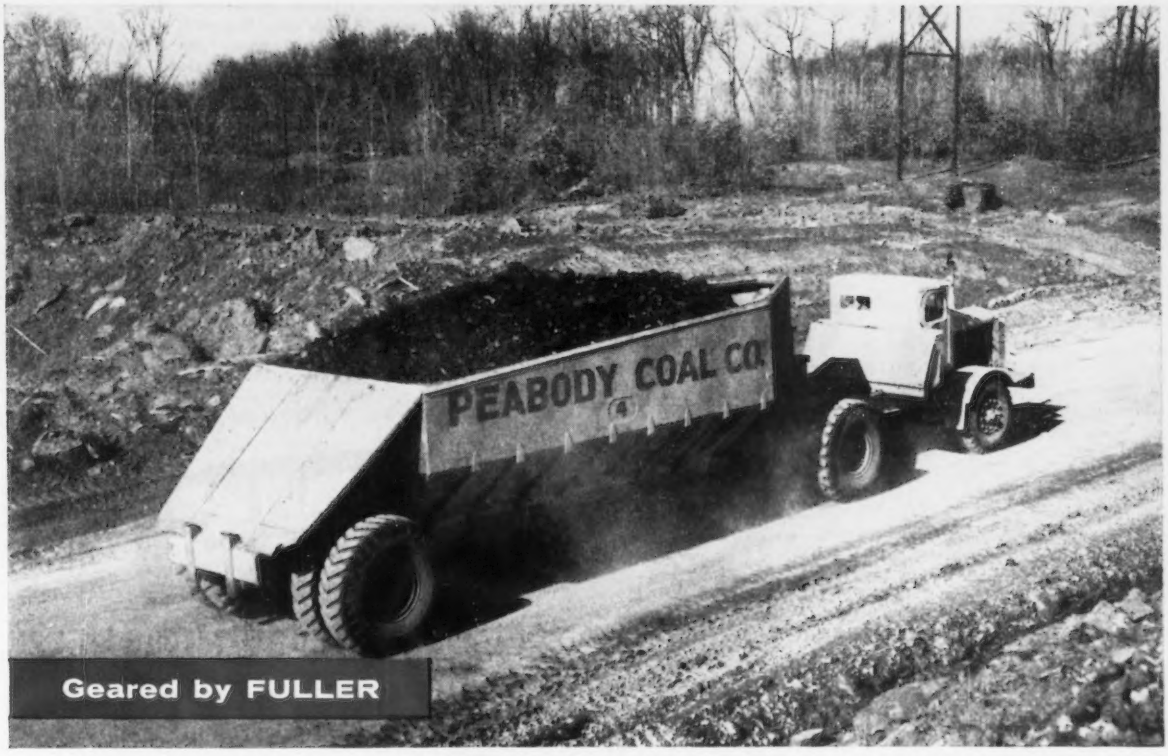
A 60-mile cableway will connect the mining area, near Franceville, with the rail head at M'Binda, from which 2500-ton ore shipments will make the 300 mile run to Pointe-Noire.

**South Africa d'd a brisk trade in 400-oz. and 1-kg. gold bars** outside the sterling area last year. Direct sales by the S.A. Reserve Bank amounted to about 6-million oz. and sales by the Chamber of Mines 350,000 oz.

**H.C. Koch, a director and manager of Anglo American Corp. has been elected President of the Transvaal and Orange Free State Chamber of Mines.** He is chairman of several companies in the Anglo-American group and is a member of the Atomic Energy Board and the Economic Advisory Council.

**The drying up of overseas capital sources** and the fact that South Africa's limited internally created capital is in demand by all sectors suggests that there could now be a tendency for ore reserves to be depleted faster than they can be replaced by opening new mining grounds, says Mr. C. B. Anderson, retiring President of the Chamber of Mines. The mining industry was already drawing largely from its own resources to finance development.

**Gold production in South Africa has been raised by 46%** in six years representing additional foreign exchange earnings of about R476-million and the record results for 1960 leave no doubt of the industry's innate vigour and capacity for fresh advances, C. B. Anderson told Chamber of Mines annual meeting. The Free State alone produces more than Canada, which is the second biggest producer in the Free World. The Free




Peabody Coal Company of St. Louis, Missouri hauls 52-ton loads from their River King Mine in Illinois with *Fuller-equipped* Model 129TDT Euclid Tractors. These ten Euclid Tractors pull Model 124 Wagons with 61 cubic yard capacities. Engines in the Peabody Euclids are Cummins 350 hp V8 and NRTO 330 hp diesels and 12V71 336 hp Detroit Diesels. All drive through Fuller R-1160 ROADRANGER Transmissions and 14.96:1 axles.

# Designed for Coal Hauling Equipment

## Model R-1160 ROADRANGER Transmissions

Faster, smoother operation, greater fuel economy, faster cycles, and longer gear and bearing life are offered by the Fuller R-1160 ROADRANGER Transmission.

### Check these advantages:

- No gear splitting—nine selective ratios evenly and progressively spaced (average of 38% steps).
- Easier, smoother shifting—one shift lever controls all nine forward and two reverse speeds.
- Pre-selected range shifts — automatic and synchronized, with range selector located on the shift lever.
- Quicker up shifts for constant operation in peak horsepower range — assured by Fuller air powered countershaft inertia brake.
- Prolonged gear and bearing life—Pressure Lubrication and Filtration System provides positive lubrication and maintains clean lubricating oil to prolong gear life.

| Gear | Ratio | % Step | |
|---|---|---|---|
| 9th | .75 | 33 | |
| 8th | 1.00 | 39 | HIGH RANGE |
| 7th | 1.39 | 40 | Reverse 3.31 |
| 6th | 1.94 | 34 | |
| 5th | 2.59 | | |
| RANGE SHIFT | | | |
| 4th | 3.48 | 39 | |
| 3rd | 4.84 | 40 | LOW RANGE |
| 2nd | 6.76 | 34 | Reverse 11.53 |
| 1st | 9.02 | | |

Weight: 1133 lbs. Length: 44 21/32"
Clutch Housing Size: SAE No. 1
Oil Capacity: 35 pts.; w/filter 38 pts.
Approximate Engine Size: 1160 cu. in.

**FULLER TRANSMISSION DIVISION**
**EATON MANUFACTURING COMPANY**
**KALAMAZOO, MICHIGAN**

Sales & Service: West. Dist. Branch, Oakland 6, Cal. • Southwest Dist. Office, Tulsa 3, Okla. • Automotive Products Co., Ltd., Brock House, Langham St., London W.1, England, European Rep.

State shares this distinction with the East Rand.

**The construction this year** of two smelting works on the Bauchi plateau, Nigeria's tin producing region, should be of immense importance to its smaller operators.

Since tin ore was discovered on the plateau some 50 years ago it has been shipped to Liverpool and smelted in the Bottle works of Messrs. Williams' Harvey and Co., Ltd. This shipment involved considerable expense and inconvenience to smaller companies (of the 112 African and European mining firms on the plateau only eight are of large size), because it meant they had to wait for a minimum of four months for their money. With smelting done on the plateau the operators will receive payment immediately.

The first smelter to begin operation was Nigerian Embel Tin Smelting Co. Ltd, a Portuguese firm which arrived late in 1959 and smelted its first ore last March. The Embel works has three electric furnaces, each with a daily capacity of five tons of ore and three tons of metal. Currently only one furnace is working due to a power shortage in Jos. If sufficient power becomes available, Embel will have eight furnaces in operation by the end of the year. Embel's first shipment of 100 tons of tin went to the United States in April.

Now under construction is the smelting works of Makeri Smelting Co., Ltd., a British firm controlled by Consolidated Tin Smelters (which also owns Williams' Harvey). Production will begin in August with two oil and coal firing reverbertory, regenerative furnaces, each with a rated capacity of 40 tpd of ore and 30 tpd of metal. Space will be left so that a third furnace can be built if it is needed. Either smelter will be able to handle the plateau's entire ore production.

Despite periodic reports that reserves of tin ore on Nigeria's Bauchi plateau will be exhausted in a few years, the reserves are estimated now at 131,726 tons, or only 57 tons less than the estimate of 12 years ago. Prospecting goes on continually. Last year's production of cassiterite was 10,374 tons, or 33% more than that of 1959. During 1960 Nigeria exported 8250 tons of tin metal, an increase of 40% over the previous year. The higher 1960 production figures were the result of higher quotas by the International Tin Council and the final lifting of restrictions altogether Oct. 1.

Columbite production went up from 1588 tons in 1959 to 2048 tons in 1960.

But, production of tin has not reached the level of that before restrictions were placed in 1957, mainly because much of the labor which companies let go then has drifted into other industries and into agriculture. Production is also hampered by a shortage of capital. The Federal Ministry of Mines and Power recently sent a circular to all operators asking if they contemplated capital expansion in the near future. Replies show that none is expected at least through 1963. Nigeria's average grade of ore is only 0.025% Sn, a figure which does not provide much of a margin for the absorption of further increases in production costs. A substantial increase in production is likely now that the price of tin is rising.

# IN EUROPE

## YUGOSLAVIA

**The modernized and expanded open pit copper mine at Majdanpek was put into operation in July in Serbia.** The mine will produce 3.6-millions of metric tons of ore this year, or 120,000 tons of 20% concentrate (prepared at the site) which will yield about 25,000 tons of pure copper. This will increase this year's output of copper in Yugoslavia to about 60,000 tons. (The other important copper mine is at Bor, also in Serbia).

However, further preparations are being made which will double the Majdanpek output by 1965. Eventually, the ore from Majdanpek will yield some 100,000 tons of copper annually. Estimated copper ore deposits in this area are 600-million tons with an average 0.7% copper content. The mine also contains a quantity of gold, silver, molybdenum, and some limonite (iron ore) deposits, making it potentially the richest


SPANG

BLAST HOLE BITS

*Drill More Holes Per Bit, At Less Cost Per Hole*

SPANG CHURN DRILL BITS, famous for long life and economy in the drilling of blast holes for the fragmentation of minerals or overburden, drill *more-holes-per-bit* at *less-cost-per-hole,* because they are fully heat-treated from end to end and have the *extra strength in pin and blade sections* to stand up under the toughest drilling conditions. They are made with semi-dressed ends for quicker, easier finish-dressing, in High Carbon, A.I.S.I. 4340, and Spang Molloy Steel.

Available also, as an added economy, are SPANG REPLACEMENT BLADE SECTIONS in the same grades of steel, and uniform forge section, for welding to pin and collar sections of original bits when long service has worn the integral blade to a point where replacement is desirable.

Anyway you look at it, SPANG BITS are your best buy for more holes at less cost per hole.

**SPANG REAMER TYPE PILOT BITS FOR DRILLING LARGE DIAMETER HOLES**

Can be supplied in all sizes and in any practical weight.

For information on SPANG BITS, and FREE CATALOG of Complete Line of SPANG Cable System Drilling and Fishing Tools, consult your nearest Dealer, or write direct to:

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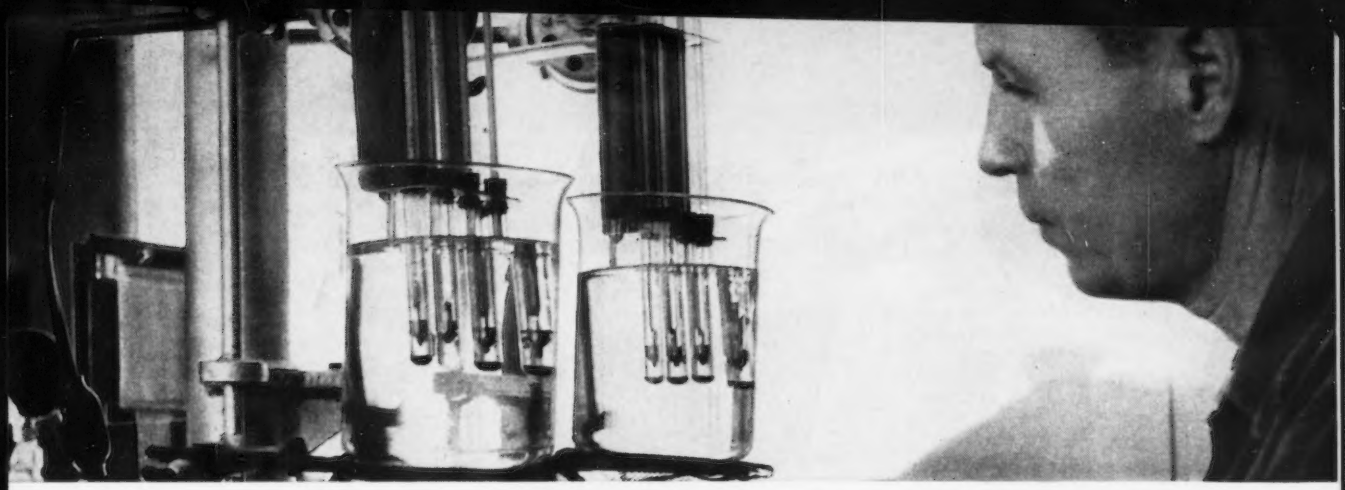
DEPT. M-2, BUTLER, PENNSYLVANIA

For over 60 years Manufacturers of Spang Weldless Jars and a Complete Line of Cable System Drilling and Fishing Tools for Oil and Gas Wells, Water Wells, Prospect Drilling and Shot Blast Holes.



**Dropping point test** shows how greases react to heat. Beaker fluid has been heated to 390° F. All greases tested except Darina (second tube from left) have passed from solid to liquid state.

# BULLETIN:

## Shell reveals the remarkable new component in Darina Grease AX that helps it last up to 3 times longer than soap-base greases

**Darina® Grease AX is made with Microgel*, the new thickening agent developed by Shell Research.**

**Severely tested for 18 months, Darina AX with Microgel proved its ability to resist washout, even in mud and slush—stay smooth and buttery at high temperatures—and reduce maintenance.**

**Read how this superior new multi-purpose grease can help solve your lubricating problems.**

THERE IS no soap in Darina Grease AX. No soap to melt away—wash away—or dissolve away.

Instead of soap, Darina AX uses Microgel—a development of Shell Research.

### What Microgel does

Because of Microgel, Darina AX has no melting point. It won't run out of bearings.

Even compared to soap-base greases, Darina AX provides significantly greater protection under adverse service conditions.

### Resists washout

Mix water into Darina AX and the grease maintains its consistency. It shrugs off water—won't emulsify. For fleets that must operate in snow, slush, rain or mud—Darina AX is an ideal choice.

### Longer lubrication life

Shell scientists tested Darina AX, under wet conditions, in a special device called an Oscillating Friction Machine.

Darina AX kept its lubricating qualities twice as long as a premium soda soap-base grease; 2½ times longer than a calcium-soap grease; 3 times longer than an aluminum-soap grease.

### Results of field test

In a recent field test, 15 firms used Darina AX in chassis and wheel bearings of over 1000 vehicles. These buses, trucks and vans rolled up 30,097,000 chassis miles. The results:

1. Every company was pleased with the performance of Darina AX.
2. There wasn't one wheel bearing failure due to grease deficiency.
3. In many cases, re-lubrication schedules could be extended.

For details, see your Shell Representative. Or write: Shell Oil Company, 50 W. 50th St., N. Y. 20, N. Y.

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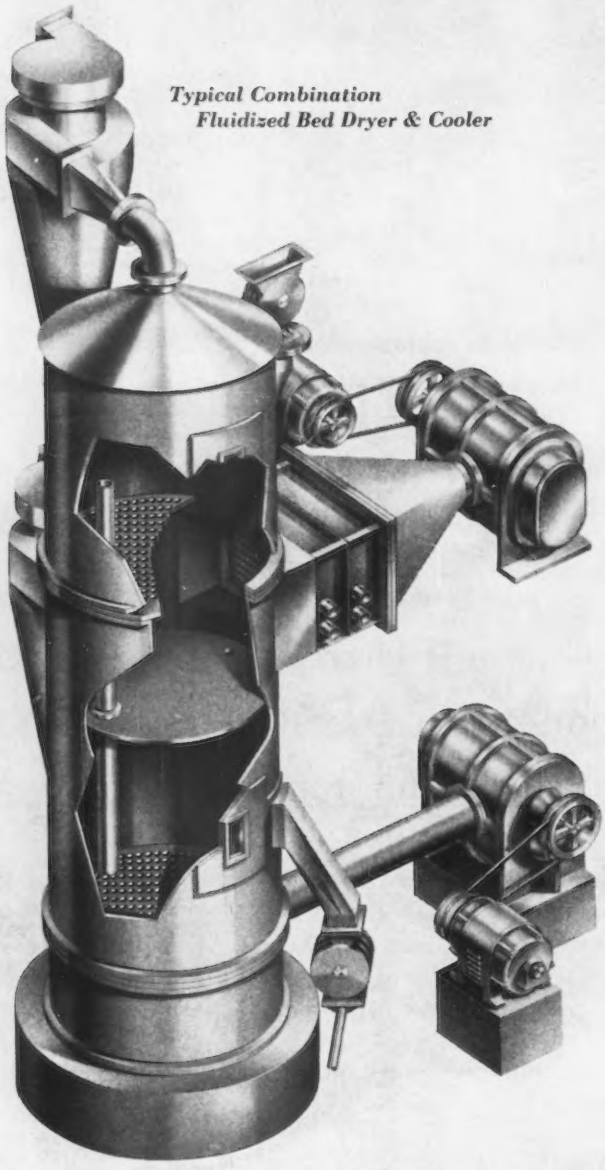
SHELL

**A BULLETIN FROM SHELL**
**—where 1,997 scientists are helping to provide better products for industry**

*Typical Combination*
*Fluidized Bed Dryer & Cooler*



# YOU'LL FIND NO "HOT SPOTS" IN LOUISVILLE FLUIDIZED BED EQUIPMENT

Louisville Fluidized Bed units are meeting with unusual success as dryers, coolers and reactors for free-flowing granular materials up to ¼" particle size. Temperatures within the units are remarkably uniform. There are *no* hot spots. The high rate of heat transfer and the constant turbulence inherent in their operation create conditions that for all practical purposes are isothermal.

The operating range of Louisville Fluidized Bed Equipment is from 50° F. in the case of coolers to as high as 1500° F. in calciners and reactors . . . up to 2500° F. in special cases. By measuring and controlling exhaust temperatures, bed temperatures are maintained within narrow limits.

Response to desired changes is practically instantaneous. Because of this sensitivity to change, the critical temperature of the material being treated can be more nearly approached than in any other kind of dryer or reactor . . . as close as 2° F. in many operations.

For more information about Louisville Fluidized Bed Equipment, please write for Bulletin FBD-61

Process Equipment Division—Louisville Dryers

GENERAL AMERICAN TRANSPORTATION CORPORATION

*135 South LaSalle Street* *Chicago 3, Illinois*

mine now in operation in Europe.

Because of the most modern automatization equipment in the enterprise, only about 600 workers are employed in the mine and the flotation plant (the refinery and rolling mill is at Sevojno and Bor, a short distance away). Around the new mine a new village has risen with some 700 living quarters, a hotel, school, shopping facilities and a cultural center.

## ITALY

**Italy's two largest iron works,** the Ilva and the Cornigliano companies, merged their operations July 1. The newly formed "Italsider-altiforni e acciairie riunite Ilva e Cornigliano S.p.A." has a capitalization of $228-million.

As did its two predecessor companies, the new corporation belongs to the Government controlled I.R.I. (Istituto Ricostruzione Industriale) holding. The new company's present productive capacity places it in the first rank of Europe's metallurgical industries. This position will be further enhanced when the newly built iron works at Taranto start production and when plans, currently under way, for the expansion of the Bagnoli iron works are completed.

# IN THE PHILIPPINES

**Benguet Consolidated reported May gold production** at 20,897 oz., valued at $731,400. The peso value was nearly four times as large. Some excellent ore has been encountered on the 1000 ft level of the Antamok property, which is being worked by Benguet. Ore developed on the Ukab claim has also improved.

**Surigao Consolidated is erecting a 200-ton mill at Guripan,** in southern Mindanao. Equipment from the old gold mill is being moved to the new copper property. The ore grade is estimated between 2 and 3% and a considerable tonnage has been developed. The first shipment is expected to be made in August. Miguel Ortigas is president of the company.

Atlas Consolidated produced 1778 tons of copper in May at its Toledo mill. Shipments totalling 2053 tons in concentrates were made to Japan, valued at 3,436,000 pesos. During the first half of June the grade of ore milled steadily improved, rising above 0.7%, but tonnage milled declined to about 10,000 tpd.

**Soriano interests have taken over operation of a silver-barite property** in Lingig, southeastern Mindanao. Barite production is over 5570 tons a year, worth about 345,000 pesos, with sliver valued at over 1-million pesos. The barite is used as heavy mud for local oil drilling.

**Marinduque Iron Mines Agents milled 119,000 tons of 0.78% copper ore** at its Sipalay mine in Oriental Negros in May. Copper content was estimated at 1,637,000 lb.

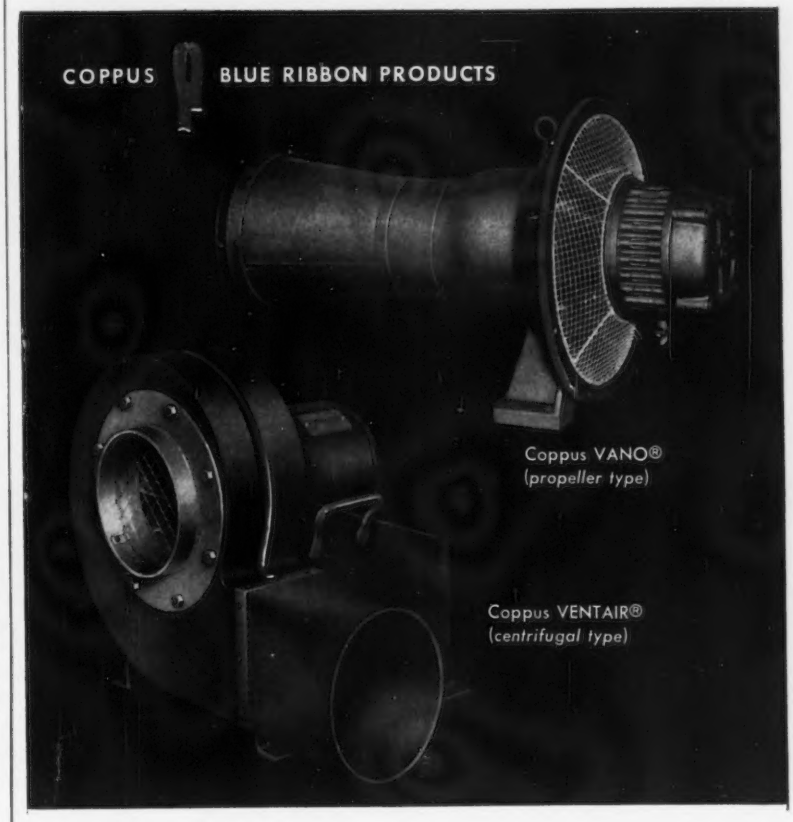
**Acoje Mining Co. announced that its mill production at Zambales for the first quarter was 29,600 tons** chrome ore, all of which was shipped to Japan. Production was about 8000 tons less than in the same period of 1960.

# THE NEAR EAST

**The Kuwait Government's Finance Department** has contracted with the West German firm of Demag AG of Duisburg as its consulting engineers on a project to set up an iron and steel industry in the already oil-rich sheikdom.

Demag will make a technical and economic feasibility study of the possibilities of making steel locally from iron ore imported from India using Kuwait's high-grade surplus natural gas as fuel.

The plan is to make 50,000 tons of structural steel annually to meet the needs of the construction industry both in Kuwait and in neighboring countries. If Demag's feasibility studies are attractive to the Kuwait Government, a joint venture will be set up, in which Demag will have option to have 30% capital participation.


***GET 30% TO 100% MORE AIR***

Coppus Blowers for mine ventilation include the centrifugal VENTAIR for long pipe lines and the propeller-type VANO for shorter lines. For a given power consumption both deliver from 30% to 100% more air than an ordinary fan.

Serving as blowers or exhausters they are driven either by electric motor or compressed air, with capacities up to 60,000 CFM. Like all Coppus Products, these blowers carry the same "Blue Ribbon" assurance of quality and dependable performance.

Representatives located in all mining areas. Other Coppus "Blue Ribbon" products: Steam turbines, gas burners, heat killers, air filters, blowers and exhausters for special purposes. See also *Thomas' Register*. Coppus Engineering Corporation, Worcester 10, Mass.

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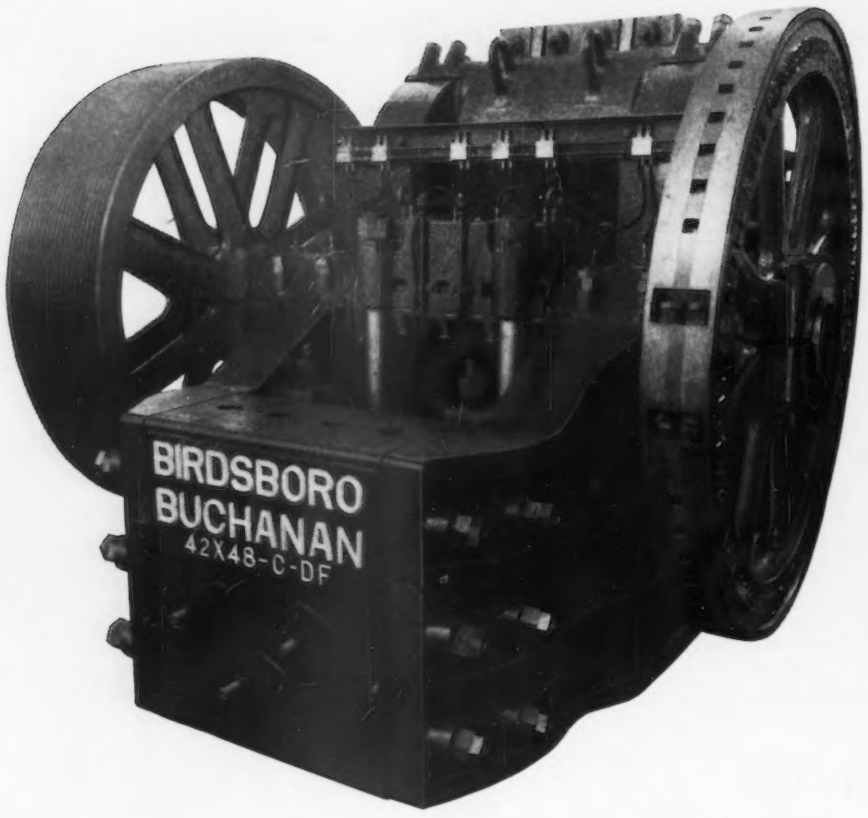
**COPPUS BLOWERS**




# GREY-BEARD TO BE

**Most Birdsboro-Buchanan jaw crushers outlast the plants in which they are used!**

Birdsboro-Buchanan deep frame primary jaw crushers are built to last. All are of high quality electric steel castings . . . thoroughly annealed. All joints are precision machined to standard templates for a more accurate fit. And their extra depth through the front head and frames provide greater strength and rigidity.

Construction features like these mean a Birdsboro-Buchanan crusher you buy now will still be making profits for you decades hence. Your Birdsboro representative will be glad to get you started on those profits right away. Write: *Sales Department, Engineering Department and Mfg. Plant:* Birdsboro, Pa., *District Office:* Pittsburgh, Pa.

**Canadian Representative & Manufacturer: John Inglis Co., Ltd., Toronto, Can.**

*World-Wide Agent Representation.* Contact home office for nearest representative.

CR 33-61

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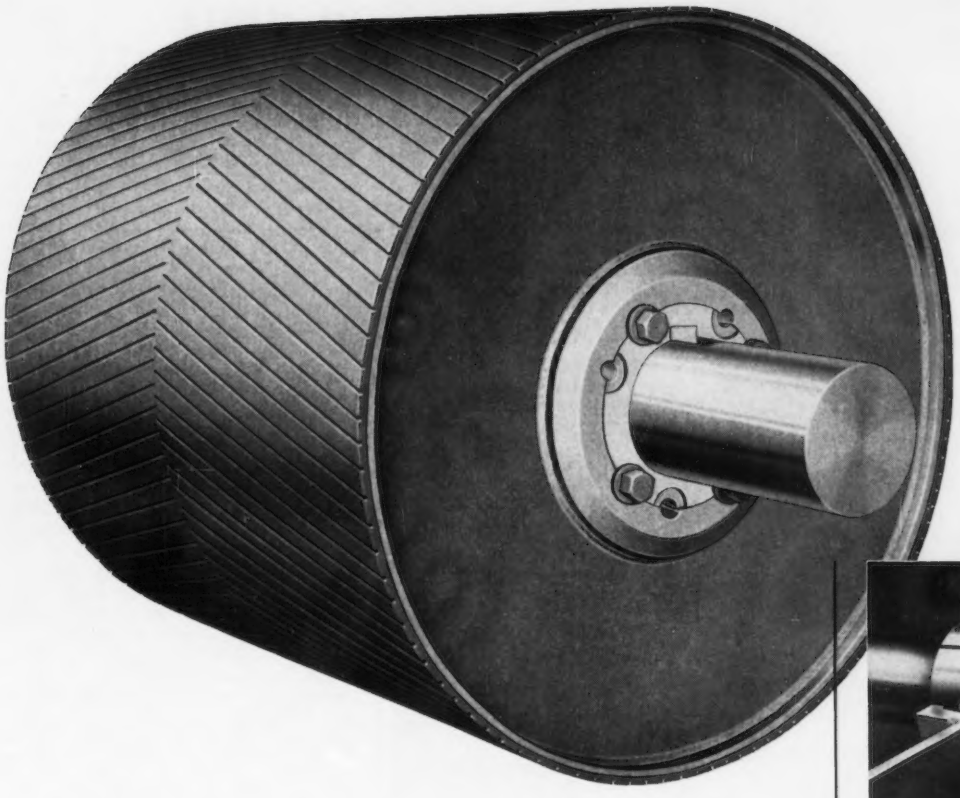
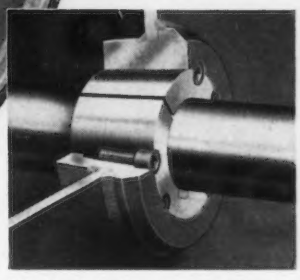
**CORPORATION** BIRDSBORO, PENNA.

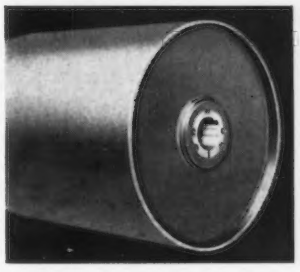
STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • ROLLS • ELECTRIC STEEL CASTINGS: Carbon, Low Alloy and STAINLESS STEEL





No "walking" on the shaft with Taper-Lock. Full length contact of hub. Holds under heavy loads and shock. Easy on — easy off.

Patented Back-up Bars give full rim strength through 100% weld penetration. Diametrically opposed bars insure balance.



Jointless construction creates a drum fully sealed against conveyed materials of all kinds as well as dirt, water and steam.

# AMERICA'S NO. 1 STEEL CONVEYOR PULLEY!

There are more Taper-Lock Steel Conveyor Pulleys than any other operating on big jobs. Why? Simply because of the dependable performance they deliver under the toughest conditions.

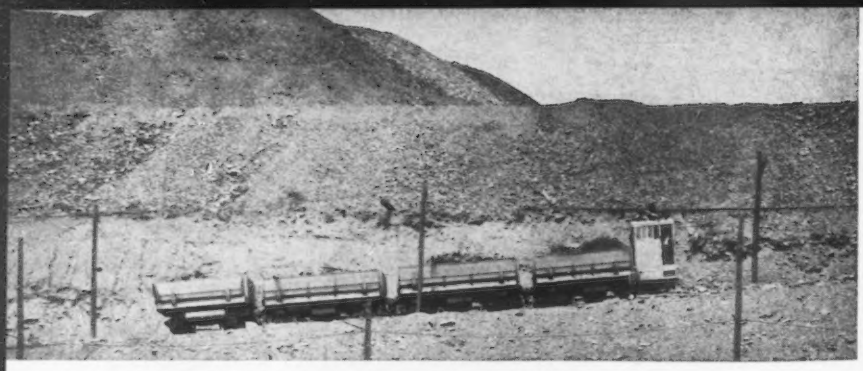
The rims, discs and hubs are *steel* — and they are fused together into jointless drum construction for (1) maximum strength with minimum weight, (2) exclusion of dirt, water and steam, (3) terrific shock resistance. Every weld is made by the submerged arc process giving deep penetration and exceptional strength. Rims are accurately die formed in the smaller diameters and rolled in the larger diameters. Pulleys with 26″ and wider faces have interior discs that add to the trueness, rigidity and strength of the rims.

Dodge offers the world's biggest range of stock sizes. Diameters from 6 inches to 8 feet — all face widths, crowned or flat. Standard or special rubber lagging available. Ask your local Dodge Distributor — or write us for a technical bulletin.

Dodge Manufacturing Corporation, 3100 Union Street, Mishawaka, Indiana

*The Products with the Pluses...* **DODGE** *of Mishawaka, Ind.*

**CALL THE TRANSMISSIONEER,** your local Dodge Distributor. Look under "Dodge Transmissioneer" in the white pages of your phone book. Factory trained by Dodge, he can give you valuable assistance on new cost-saving methods.

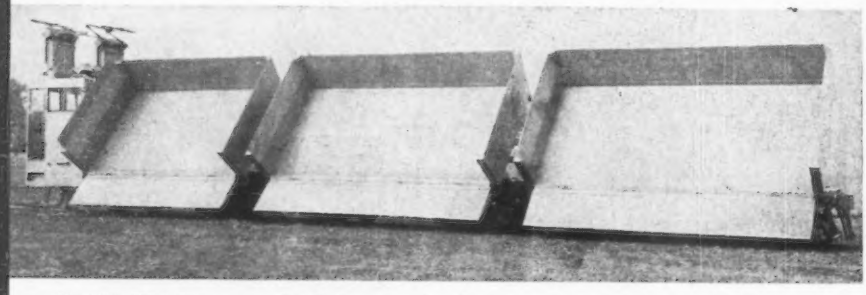


DIFFERENTIAL steep grade rail PACK TRAIN®

Up and down a 10% grade with DIFFERENTIAL ELECTRIC WHEELS for 13 years without an accident.

Uses trolley for fast climbing up 10% grade. Small auxiliary diesel-electric generator may be used for level track. With steel wheels on steel rails, tractive effort required is 5# per ton on level track, and 205# per ton up 10% grade.

Controlled speed with electric braking down 10% grade. Saves brake shoe and wheel wear. Capacities 1000 HP to 3000 HP.



PACK TRAIN uses rail all the way for lowest transportation cost. Dumps to either side all at once or one at a time.

250 HP DIFFERENTIAL two-way side dump WAGON TRAIN

A convenient way to unload. 45 ton highway train (15 tons in each wagon). 800 HP 90 ton off-highway train (30 tons in each wagon). Light weight trains haul heavy loads.

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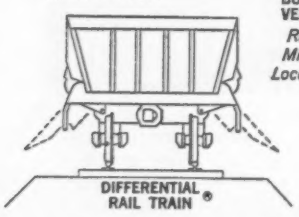


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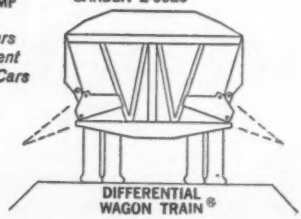



Rent Differential WAGON TRAINS from DIFCO, Findlay, Ohio


# IN INDIA

**India has received orders for** the export of 48,000 tons of monazite to various European countries and Japan during the 1962-63 period. India is committed to supply roughly 12,000 tons to Europe and an equal amount to Japan. The orders are expected substantially to assist the Government's rare earths plant at Alwaye, Kerala state (South India), whose sales of chloride in past years have been unsatisfactory. It's reported sales began to look up last year, when Japan increased its order three-fold resulting in a clearance of accumulated stock. The result of renewed interest is the Government's decision to increase the Alwaye plant's processing capacity to 24,000 tons of monazite per year.

**India produced roughly $334-million worth** of minerals in 1960 as compared with production of approximately $296-million worth in 1959. This increase of about 13% was attributed chiefly to the increase in the output of coal, iron-ore, bauxite, copper ore, china clay, dolomite, limestone, and salt, enabling India to earn a total foreign exchange of $107,310,000 in 1960 compared with $98,700,000 the previous year.

Coal, with an output of 52.6-million tons, topped the production list, accounting for 68% of the total value of minerals produced. Among the metals, there was a record output of iron ore, reaching a peak of 10.68-million tons, and bauxite. In 1960, India exported 3.6-million tons of iron ore, and her output of manganese ore was valued at $17,220,000.

From New Delhi comes news that the World Bank has offered a loan of $20-million for the development of coal.

## Bunker Hill Switches to Underground Sand Filling

STOPE FILLING with rock waste, the traditional method, will be pushed into the past at Bunker Hill Mining Co.'s Kellogg, Ida., mines. An automatic sand filling operation, the first major mining variation at Kellogg in several years, should be onstream this month. Now, instead of filling both abandoned and working stopes with rock from past blasting operations, Bunker Hill will pump reclaimed sand into the mine workings.

Several advantages come built in with the sand-fill system, and they account for the reasons behind Bunker Hill's changeover. For one, stopes can be filled, put back into action much faster, and this means a cut in the time a productive stope must remain idle. Mine transportation problems—including cost—are also reduced: and one step of the process, moving waste rock from the concentrator back to the stope, is eliminated.

Bunker Hill has studied sand filling for the past two years, decided to convert the Kellogg system when it had seen other mining operations' results with the process. Present plans call for substitu-

T-WEDGE KLEENSLOT

A new concept in guard bar design. T-shaped wire replaces typical "bar" to increase screening surface while keeping large unscreenable lumps of material above the tolerance governing lower screening surface.

F217 and F250
KLEENSLOT

Manufactured with large size wedge shaped wires to maintain maximum efficiency over an extended period in abrasive applications.

Although large in wire size, this screen will easily maintain openings as close as 1 m.m.

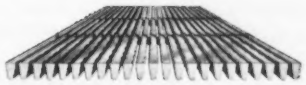
G187 and GB187
MIGH-TEE KLEENSLOT

Special profile increases wearing surface. This is a heavy duty precision type screen that will easily maintain openings smaller than ⅛ m.m. and openings larger than ordinarily considered economical.

"S" KLEENSLOT

Engineered for applications where screening out of flats or slivers is of prime consideration. Can be also furnished in a "C" bend. Recommended for applications requiring openings larger than 1 m.m. For smaller openings, see Marcel screen.

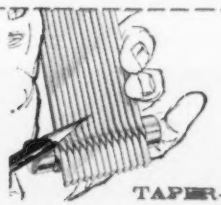
MARCEL



This screen, while screening out "slivers," presents a flat surface for materials to wipe the opening clean. Available with openings up to 1 m.m.—for larger openings see "S" screens.

SCREEN GUARD

Vertical guard bars keep larger unscreenable materials above the actual screening surface. This increases screen life and promotes much greater efficiency in dewatering.



TAPER-SLOT

From loop to loop, the screen opening gradually increases. This design is to eliminate blinding when screening large amounts of near-opening size materials.

For example: .016 opening tapered to .024—the combination of opening sizes would be the same between each loop throughout the entire screen.

WEDGE-WIRE

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## PREPARATION SCREENS

*designed for vibrators or stationary applications for dewatering, screening, washing, extracting, filtering or sizing applications.*

Wedge-Wire Kleenslot Screens are custom manufactured to your application and are available in many sizes, metals and finishes. Our engineering staff will assist you capably and promptly in obtaining the proper screen for highest production at lowest cost.

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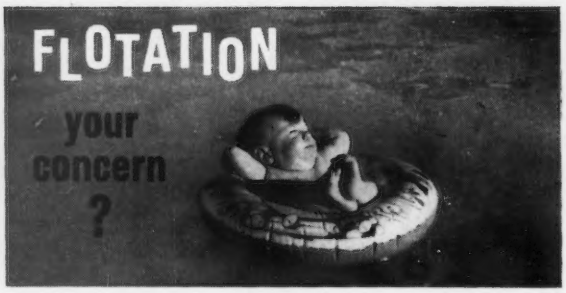


Sodium silicate is the reagent most often preferred to depress quartz and silicate minerals; to disperse siliceous and iron-oxide slimes. Also used with heavy-metal salts, PQ sodium silicate is a strong depressant for nonsulphide minerals:

| | | |
|---|---|---|
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| scheelite | rutile | andalusite |
| apatite | hematite | beryl |
| barite | magnetite | spodumene |
| magnesite | diaspore | feldspar |
| wolframite | zircon | talc |

You may choose from 40 products in the PQ sodium silicate line including liquids, powders and solids. Please contact us for literature and samples in your investigation of conditioning agents.

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9 PLANTS • DISTRIBUTORS IN OVER 65 CITIES
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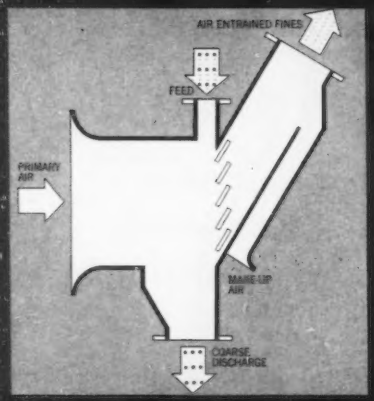
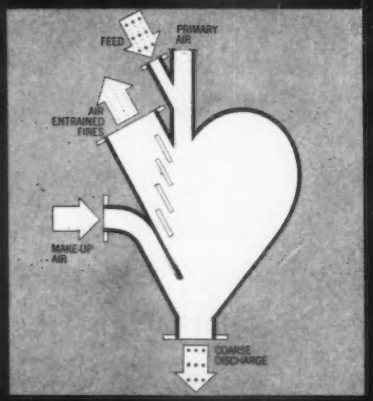
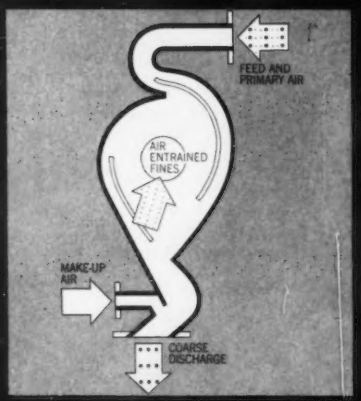
## More and More Products are now sized with BUELL CLASSIFIERS




**Gravitational Classifier**—Replaces screens and sieves in the 20 to 65 mesh range with comparable or better efficiency. Low maintenance, instant control of cut point and limited space requirements.




**Gravitational-Inertial Classifier**—Extremely high efficiencies for separation in 65-200 mesh range. Pneumatic conveying and elevating of feed and fines, no moving parts, single damper to control cut points.




**Centrifugal Classifier**—Unmatched performance in the 200 mesh to 20 microns size range. No moving parts, easy adjustment of cut points, and pneumatic conveying and elevating of feed and fines.

Classifiers can be operated in series to obtain several closely sized fractions in one continuous operation.

**Write: Buell Engineering Co., Dept. 19-H, 123 William St., New York 38, N. Y. Other Products: Electric Precipitators • Cyclones • Bag Collectors • Combination Systems**

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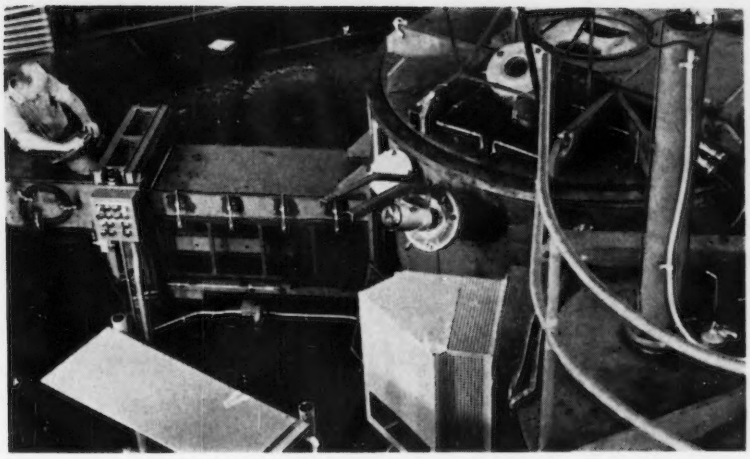

## Huge Electron Beam Furnace Is Onstream at Temescal

THE LARGEST electron beam furnace ever built—three stories high and with a capacity of more than 1-million lb yer yr of specialty steels and refractory metals—was recently brought onstream by Temescal Metallurgical Corp., Berkeley, Calif.

Temescal president, Hugh Smith Jr., said the company will use crude grades of starting material and still produce larger and more highly purified ingots than could be possible by other methods. The furnace can produce ingots up to 20 in. in dia and 6 ft long.

The electron beam process was in the development stage for about eight years, and, though there are other EB furnaces in production work, Temescal's new unit is the first designed to turn out ingots on a truly commercial scale—has a capacity of about five times that of the next largest furnace now in operation.


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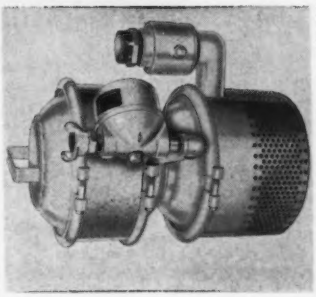
**LAYTON PNEUMATIC PUMPS**
*"proven mine utility pumps"*

Powered by compressed air for more effective, more efficient pumping of liquids containing high percentage of solids or just plain water. Both models require just 20 c.f.m. of air at 100 p.s.i. Model DA-4 discharges 6300 g.p.h. at 10 ft. discharge head—2160 g.p.h. at 100 ft.
Layton pumps are one-man portable . . . self priming . . . quiet in operation . . . safe . . . fireproof . . . odorless. Submerge in liquid or use suction hose.

Pumping out settling sump in upper Canada mine. Shows air hose and water hose mixing settled mud into pumpable slurry. About 40 tons of mud filling 60-75 one ton cars per eight hour shift.



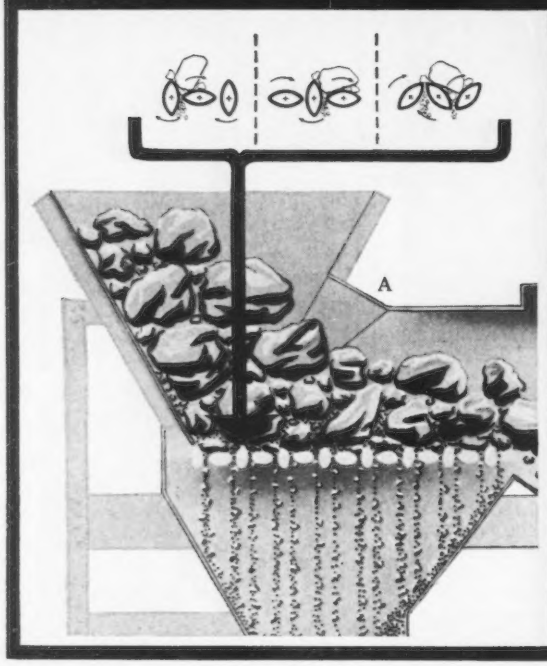
Model DA-4; Weight 79 lbs., Height 21", Width 18".

Model DA-4; Weight 79 lbs., Height 21", Length 16¼", Width 16¼".

*Distributors in all principal cities—write for catalog on further details.

**LAYTON COMPANY, INC.**
4749 S. Whitnall Ave.
Cudahy, Wis.

# Wobbler Feeder




## Doubles primary capacity of limestone operation

A prominent Arkansas white lime company installed a Wobbler Feeder to satisfy their need for a uniform size material with minimum fines for calcination. They also wanted increased output.

They doubled the primary capacity of their limestone operation. And they got a high quality finished product.

Here's how: the Wobbler Feeder (A) takes material directly from the quarry. The tumbling, rocking, forward motion of the load on the Wobbler, quickly and efficiently sifts fine clay and material under 4½" to bottom conveyor, by-passing the jaw crusher completely. Because the Wobbler scalps as it feeds without binding or plugging, it is particularly valuable in wet, sticky material.

The Lime Company's Wobbler Feeder handles from 1200 to 1500 tons per day. Since the Wobbler sends only oversize to the primary crusher, the crusher can handle more material per day, and the Wobbler requires less power than any previous feeding equipment. It is not surprizing that this Arkansas producer is pleased with his purchase.

Learn more about the profitable advantages of the Wobbler Feeder.

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**HAMMERMILLS, INC.**

Subsidiary of PETTIBONE Mulliken Corp

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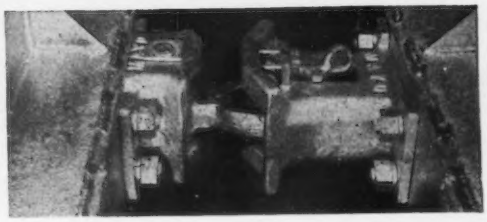

## Mayo Mine Car Coupler

*. . . the coupler with the mating instinct*

Mayo's new, cast steel coupler for narrow gauge mine cars couples instantly on tangent or curves. Safe, self-centering link completely eliminates all hazards of hand couplings. Only a little more expensive than link-and-pin, it more than pays for itself by preventing accidents. If you can save one smashed finger, you've got these couplers paid for. Easily installed by bolting to existing cars. Write for Bulletin No. 21.

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## There's a "Euc" Rear-Dump just right for your work!

Whatever your mine and quarry hauling job may be — stripping overburden, waste disposal, moving ore, rock and other materials— there's a type and size of job proved Euclid that can cut costs and step up production. With unmatched field experience and the parts and service facilities of a world wide dealer organization, "Eucs" meet every requirement for big performance on the toughest jobs.

For facts and figures proof that Euclid work-ability can mean lower costs and bring a better return on investment, call the Euclid dealer in your area.

**EUCLID** **Division of General Motors, Cleveland 17, Ohio**
*Plants at Cleveland and Hudson, Ohio and Lanarkshire, Scotland*

R-10 10 TONS
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R-45 45 TONS
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**Portable Steel Pipe with Integral Couplings**

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***EASY INSTALLATION***

Couplings are assembled and tightened by hand even in darkness. No special tools needed.

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One man can handle 30-foot section weighing 40 lbs. Saves time moving from one location to another.

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Leakproof gasket is built in; will not dislodge during transportation, installation or disassembly.

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Easily follows branch lines, sharp radius curves and natural contours. Ceiling and wall mountings are readily installed.

***AVAILABLE IN SIZES:***

**2-3/8", 2-7/8" AND 4" O.D.**

**Couplings adaptable to standard pipe**

Fast-Line couplings have various adapters for take-off lines.

Light weight of pipe permits mine roof hanging.

**Write for full details and literature**

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MANUFACTURING COMPANY

**PITTSBURGH 9, PA.**

*Quality Metal Products Since 1900*


## Sand Fill *(Continued)*

tion of 10-ton skips for the 8-ton skip now used to hoist waste rock out of the mine.

Converting to sand fill breaks down, according to Bunker Hill's plan, into four major steps:

1. Tailings from the ore concentration operation go through five cyclone classifiers located on the surface. At this stage, some slimes are left with the sand, to act as lubricants and prevent pipeline damage.
2. The partially purified sand moves nearly two miles underground to another unit, where it is diluted and re-cycloned, removing the surplus water and the last traces of slime.
3. The sand is then stored in a 370-ton tank on one of the upper mine levels.
4. And, finally, when stope areas lower in the mine need sand for filling, an operator releases the right amount through 3-in. pipelines to the working.

Bunker Hill expects its biggest problem will be step 1: achieving a nearly perfect separation between the slimes and sands that will recover large enough grains of sand to make the project worthwhile. And the company's milling process, ironically enough, is the major roadblock: tailings are ground so fine that adequate separation becomes difficult. Bunker Hill's solution is to use two cycloning steps, which should return 60 tons of sand from every 100 tons of tailings.

As for the last step, the sand-fill system requires only one operator to regulate the process from the stope area. A monitor board at the mill will indicate whether the system is working properly.

Five companies will help Bunker Hill install the sand-fill system. Westinghouse will program automation of the separation steps as well as the pumping of the sand underground, while Foxboro will handle control of the fill as it moves from the storage tank to the stopes. To do the latter, Foxboro plans using an instrument provided by Industrial Nucleonics, the AccuRay, which measures sand density in the pipe by registering gamma radiation from a compound mixed with the fill. Orbitran Corp. will install a telemetering complex, composed of 60,000 ft of communication lines, and Allen-Sherman-Hoff Co. will supply pumps for the operation.

# LETTERS

## Proposed Price Support for Gold

*The following is the body of a proposal by the Siskiyou Miners' Assn., Yreka, Calif., recently adopted by that state's legislature. E. C. Latchem, president of the association, points out that "gold purchased under this Treasury grant plan would be impounded or stockpiled as a future support to our monetary system as Congress may direct . . . There is no question that there is enough gold in the subsurface to justify application of this plan. Engineers claim there is*


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Consider a Custom Riblet Aerial Tramway for transporting your raw materials. It is more than likely that Riblet can lower hauling costs by rising above your unique topographical situation. Riblet's total transportation cost is less than that of most modes of carrying. Write for complete information.

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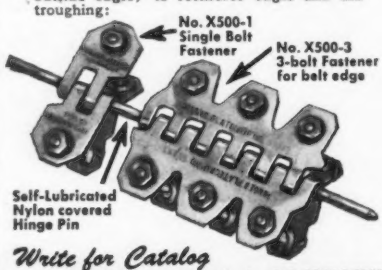
HINGED PLATEGRIP

Recommended for mines, quarries, construction work, storage yards — wherever belts length must be frequently changed. Hinged Plategrip Fasteners make a strong, flexible joint in heavy duty conveyor belts, trough naturally, ride smoothly over pulleys, yet can be separated by simply pulling the hinge pin. *Improved* design takes the new smaller diameter self-lubricating nylon sheathed cable hinge pins. No. X500-1 single bolt fasteners and No. X500-3 3 bolt fasteners (used at outside edges) to reinforce edges and aid troughing:

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**ARMSTRONG-BRAY & COMPANY**
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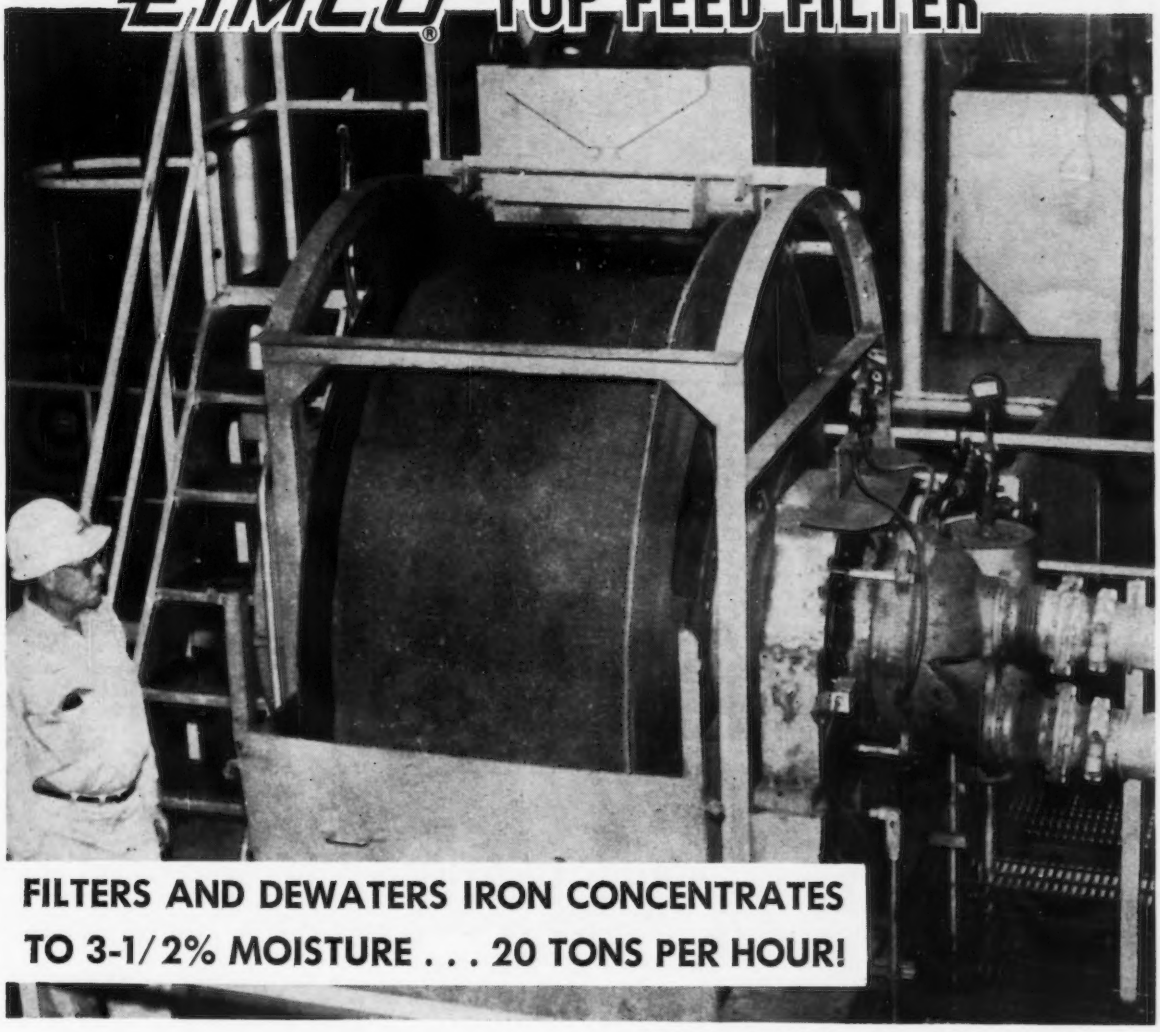
# EIMCO® TOP FEED FILTER



## FILTERS AND DEWATERS IRON CONCENTRATES TO 3-1/2% MOISTURE . . . 20 TONS PER HOUR!

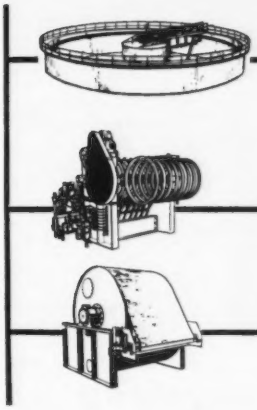
The extent to which the Top Feed Filter has grown in its capabilities for metallurgical processing is illustrated in the special 6-ft. diameter by 3-ft. Eimco unit shown above.

Hematite ore concentrates from spirals are dewatered to 3.5 percent moisture or less at the rate of up to 20 long tons per hour. Space requirements are negligible. Heavy feed is handled, most of which is coarser than 200-mesh.

A special feed box was engineered by Eimco to deposit the coarser particles across the drum face first, with finer ground particles deposited on top, resulting in the formation of an exceptionally efficient filtering medium.

Ask the Eimco representative in your area for additional facts about Top Feed Filters, a specialized filter that is unequalled for simplicity in design and low cost for handling coarse feed. Write Eimco Filter Division for Bulletin F-2042.

**THESE EIMCO PRODUCTS, TOO, CUT COSTS IN MINING . . .**



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Now fully automated, capable of multi-cycle operation without operator attention.

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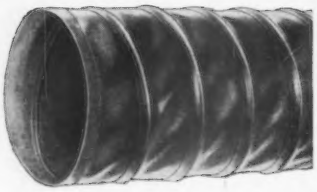
# SAVE TIME, CUT COSTS, BE SAFE
## with ABC Mine Duct
### Wire Reinforced Flexible Ventilation Tubing



For safe, economical removal by suction of fumes, fouled air and dust from mines, tunnels, bilges, manholes, tanks, furnaces, or for blowing in fresh air. Also for moving hot or cooled air in temporary heating, cooling or drying situations. Neoprene coating is airtight, resists friction, oil, moisture. Yellow for high visibility. Withstands flexing. Reinforcing wire completely covered. Easy to hang. Simple to couple. Lightweight—only 1/3 of metal duct. Flame resistant. Retractable for carrying or storage. Wide range of diameters.

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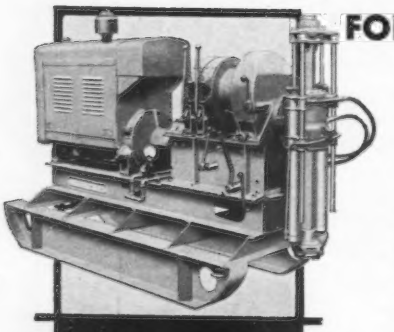
# THE S&H 142-C
## A RUGGED DRILL FOR RUGGED WORK



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*more unmined gold than production thus far . . . Many mines have large bodies of marginal value ore which will become profitable to process under this new price." Your comments and suggestions are welcome.*

**Senate Joint Resolution No. 8**—*Resolved by the Senate and Assembly of the State of California, jointly,* That it is the sense of the Legislature that the following program should be adopted by the United States:

1. A Treasury grant should be provided in the sum of $45 per ounce of newly mined domestic gold. This should be in addition to the present price of $35, thereby making a total price of $80.
2. The Treasury grant price of $45 should apply for a minimum term of 14 years with right of extension for special development.
3. To aid in early maximum production of gold without hindrance during the current gold crisis, all restrictions on mining on all government lands should be removed, including restrictions in connection with power and military withdrawals (excepting those lands in withdrawn areas actually in use) and the general mining law of 1872 should again become applicable.
4. To further aid in an early resumption of gold mining, an examining board should be set up by Congress to assess the amount of damage and order payment to those mines that were closed by War Production Board Limiting Order L-208.
5. A short term of seven years should be allowed for amortization during this crisis period.
6. An additional depletion allowance should be provided for deep mines to compensate for increased cost of operation. The amount should be 5 percent for mines requiring hoisting or pumping 200-300 feet deep, 10 percent for mines 1000 feet deep and 15 percent for deeper mines.
7. The gold so produced should be only newly mined domestic gold with supporting affidavits to verify. Violation should carry heavy penalties; and be it further

*Resolved,* That the Legislature of the State of California respectfully urges Congress to enact the above program into law; and be it further

*Resolved,* That the Secretary of the Senate is hereby directed to transmit a copy of this resolution to the Vice President of the United States, to the Speaker of the House of Representatives, and to each Senator and Representative from California in the Congress of the United States.

## Argentine Tungsten Reserves

**Recently I have been** rereading the various articles on Tungsten which have from time to time been published in Engineering and Mining Journal. In May 1960, in "A Detailed Look at Present Supplies, World Molybdenum and Tungsten Resources," the following is stated:

"Argentina's pampa range has the most deposits. Los Condores is the largest mine with $WO_3$ of 0.5%. Maximum

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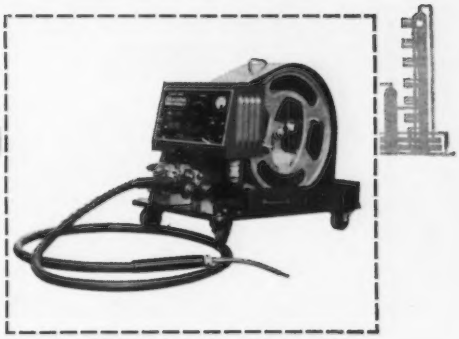
Full line of rods and electrodes for manual application.



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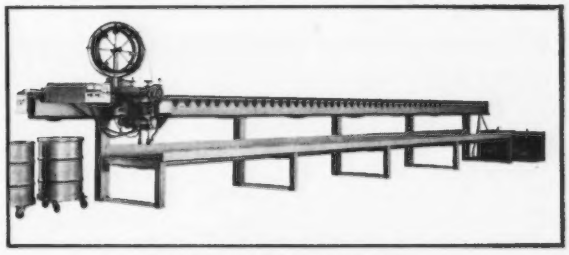
When you specify STOODY HARD-FACING ALLOYS you get more than metallurgical skill alone! STOODY backs its wear resistant products with over 40 year's field experience... 40 years of *exclusive and continuous dedication to the development and manufacture of superior hard-facing alloys!*



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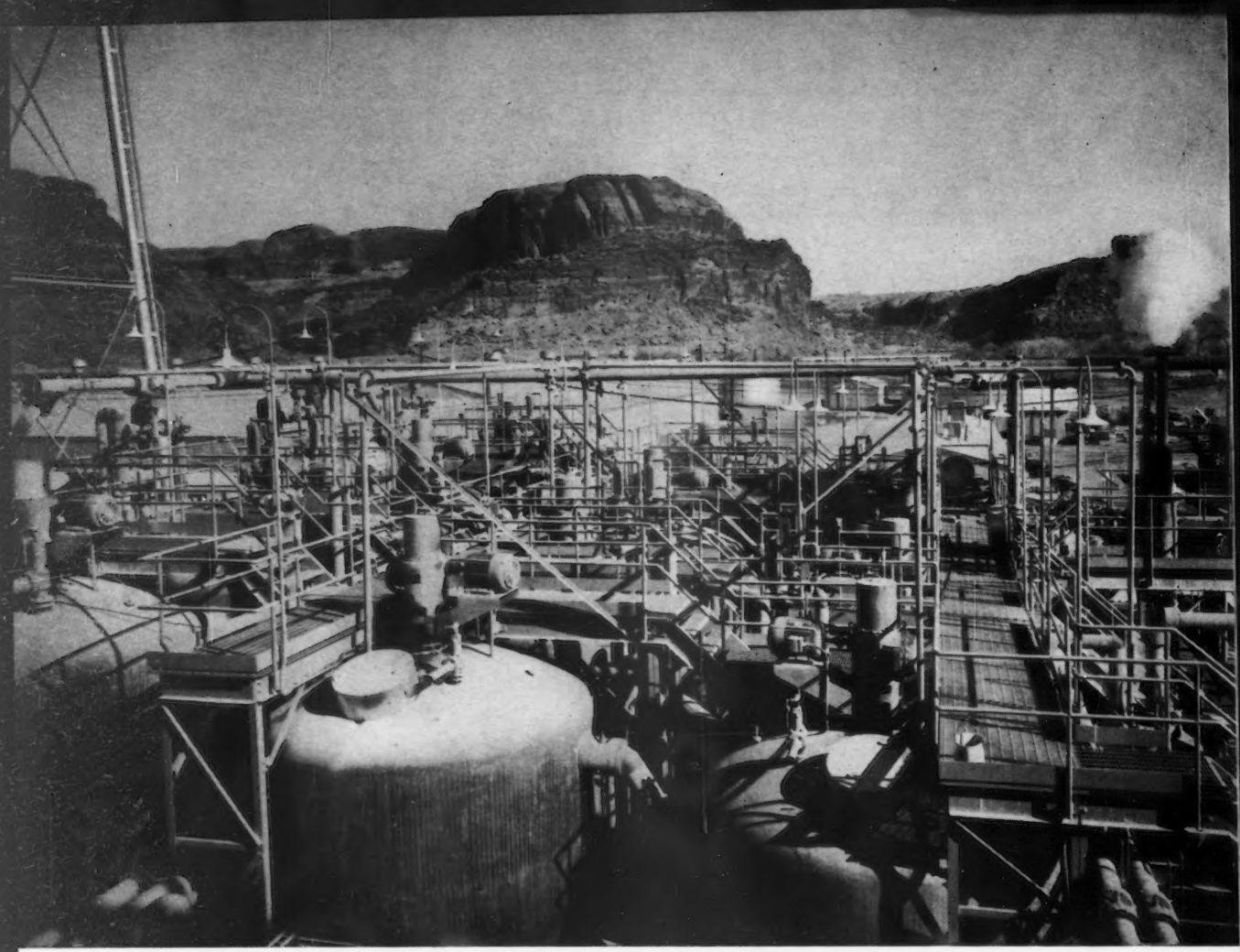

**ALKALINE LEACH CIRCUIT,** equipped with 12 Series "E" LIGHTNIN Mixers, handles high-lime ore with a 96% recovery at Ureco. Process design by Knowles Associates (Roman Chelminski). *Constructor:* Western-Knapp Engineering Co.

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*In Europe: Lightnin Mixers, Ltd., Poynton, Cheshire, England*

## Letters *(Continued)*

production was obtained in the Pampa range in 1943 at 15,800 STU."

This information is incorrect. The production during 1943 of Los Condores Mine, which is owned and operated by this company, was 53,559 STU. According to published figures, the production of the Argentine Republic during 1943 was 2390 metric tons basis 60% $WO_3$ containing 158,071 STU.

Under the heading "World Tungsten Reserves in 1954," the Argentine reserve is estimated at 500,000 STU, which I consider largely underestimated considering that the production of tungsten concentrates during the period 1954 to date can be estimated at 500,000 STU.

**B. R. Burnett**
**Sociedad Minera Argentina**
**Buenos Aires**

## KYANITE IS CIANITE NOT CAINITE

**In E&MJ's December** story on the new Montecatini plant in Sicily, there has been some misunderstanding in the translation of the Italian word "cainite". This is not the American "kyanite" (in Italian, "cianite"), which is one of the crystal forms of the well known chemical compound $AlSiO_5$, but rather a potash complex salt.

**Dr. Federico Squarzina**
**Industria Mineraria**
**Rome**

## DO YOU KNOW THIS MAN?

*Editor's Note: We like to answer readers' questions, but this one has us stumped. Can you help Mr. Cirkel identify his namesake?*

**In the German** periodical GLUCKAUF, a mining periodical published at Essen, I read a note about an essay entitled "Hydraulicking at Beauce Co., Quebec". This essay also appeared in ENGINEERING & MINING JOURNAL, June 1, 1912. The author was F. Cirkel.

As you see, I have the same name, and now I am very much interested to know more about this F. Cirkel. Could you please give me any details available about him and help me to find out more about my namesake. I would be very grateful for any information.

**Christian Cirkel Bergreferendar**
**(23a) Hamm ü. Marl**
**(Kr. Recklinghausen) Spechtstrasse 71**

## CORRECTION:

*It has been brought to our attention that in* E&MJ, *December 1960, we reported that Cia. Minera Disputada de Las Condes, now controlled by Penarroya. was going ahead with several projects to raise its iron ore capacity. Of course we meant copper. Our sharp-eyed correspondent pointed out that the company's El Soldado, Guias del Melon, Sta. Clara and Malvas mines are all copper mines.*

*Editor*


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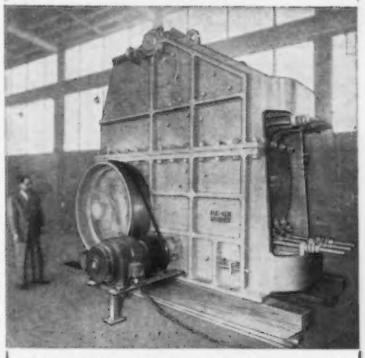

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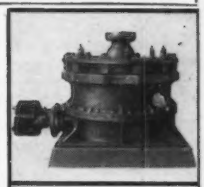

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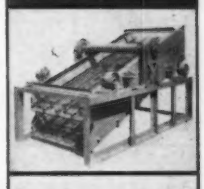

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1—Hardinge 8′ x 48′ conical pebble mill
2—Hardinge 7′ x 36″ conical pebble mills
1—Hardinge 6′ x 12′ rod mill, 150 HP
1—Hardinge 6′ x 36″ conical ball mill, 75 HP, classifiers, etc.
1—Bonnot 5′ x 10′ ball mill, 75 HP
3—Allis-Chalmers 5′ x 22′ ball-tube
1—Allis-Chalmers 6′ x 16′ ball-tube
8—Jaw Crushers: 20″ x 6″, 18″ x 9″, 36″ x 15″, 13″ x 24″, etc.

PERRY EQUIP. CORP.
1416 N. Sixth St.
Philadelphia 22, Pa.
Poplar 3-3505

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Allis Chalmers Rolls (crusher) 24″x14″, 20 h.p.
Belt Feeder, 18″x10′, 1 h.p.
Wemco Remer Jig, 5′x16′, two 7½ h.p.
Wemco Classifier, 36″x19′3″, 3 h.p.
Wemco Model C Solids Pump, 3″, 15 h.p.
Columbian Special Bolted Tank 15′4½″ dia. x 16′1″ shell with 45° hopper in 9′11½″ shell
Hummers Vibrating Screen, double deck, 3′x10′

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Telephone JA-4-7561

**CRUSHERS, JAW:** Allis Chalmers 40 x 42″ with 150 H.P. V-belt drive motor and controls, with or without heavy duty Apron Feeder 42″ x 14′3″ with motor, reducer and drive, condition guaranteed. Buchanan 30 x 42″ with motor and drive. Other crushers 8″ x 10″ to 48″ x 60″.

**CRUSHER, GYRATORY:** Telsmith 16-B, all steel, with motor and drive.

**BUCKETS:** Williams 1-¼ yd. clam shell, material handling. Blaw Knox 3 yd. and 3-½ yd. capacity.

**HOISTS, MINE TYPE:**
84″ x 63″, single drum, 150 H.P.
96″ x 90″, single drum, 600 H.P.
42″ x 30″, double drum, 75 or 150 H.P.
72″ x 50″, double drum, 400 H.P.
72″ x 64″, double drum, 400 H.P.
9′ x 58″, double drum, 900 H.P.
10′ x 10′, double clutched drums, 1250 H.P., 1-½″ rope, 1200 FPM.

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600 H.P., 2200 volt, 504 RPM.
900 H.P., 2200 volt, 444 RPM.

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Hardinge Mills, 3′x8″, 5′x22″, 8′x22″
Rod Mills, 6′x12′, 7′x15′ & 4′x11′
Ball Mills, No. 56, 7′x8′, 6′x4′ 6′x9′ & 6′x8′
Classifiers, 78″x36′6″ Duplex, 84″x42′ Spirals, 8′x35′ x16′ Bowl-Rake
24″x14″ & 30″x14″ Allis Chalmers B Roll Crushers
Cone Crushers, 22″, 2′, 3′, 4′, 5½′, 7′
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2—150 HP. 1—200 H.P. S.D. Elec. Hoists
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1—Krebs, D20
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1—WN-4 Sullivan, 400 HP.

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1—24"x70', Pioneer Stacking

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1—30"x60" Penna. Single Roll, 100 HP.

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1—#24 Longyear Truck Mounted, Complete

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2—K-89 Joy Paving Breakers
2—J-10 IR Jackhammers

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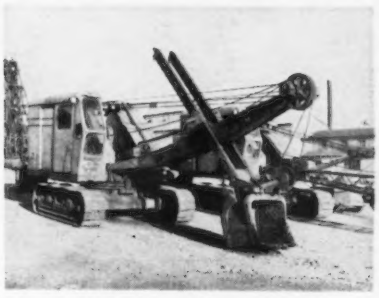

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4—3 Cell #21 Denver Equipment Co.
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1—5 Cell 56" Wemco, 10 HP.
1—8 Cell 56" Wemco, 10 HP.
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4—D6U Ingersoll Rand, Air Tugger
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2—HU Ingersoll Rand, Air
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4—30 MNM 3D Ing. Rand, 3 Drum, 440 V.
1—20 MNM 3C Ing. Rand, 3 Drum, 440 V.
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2—15 NM2F I.R. 2 drum, 15 HP.
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**LOADER**
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5—3" Wemco, Iron Lined, 10 HP.
8—4" Wemco, Iron Lined, 20 HP.
2—6" Wemco, Iron Lined, 50 HP.
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1—5" Denver Duplex Diaphragm

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3—¾" Denver Equipment Co., ½ HP.

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3—Size 25 W. LaBour, 15 HP.
1—4"x3" American-Marsh, 4 Stage, 60 HP.
1—5H Byron Jackson, 75 HP.
5—Size 20 XW LaBour, 3", 10 HP.

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6—21" Denver, Automatic

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1—5'x12' Allis Chalmers, Lowhead

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1—100 Ton Howe Railroad Track

**THICKENER**
1—14'x6' Dagley, Steel Tank

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4—DW-10 Caterpillar, Ore Hauler
3—HD-9G Allis Chalmers, w/Loader
2—T-200 Allis Chalmers, Ore Hauler

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*(Searchlight con't on pg. 164)*

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**Geneva, Switzerland** ... M. R. Zeynel
2 Place du Port, Telephone: 244274/75



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**The CARTER-WATERS Corp.**
**2440 Pennway Kansas City, Mo. Grand 1-2570**
Contact R. L. Coleman or J. R. Selbel

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1300 H.P. Vulcan DD, 1570/2500 FPM 3/60/2200.
900 H.P. Vulcan DD 1620 FPM, 3/60/2200.
700 Allis-Chalmers SD, 1900 FPM, 20,000# rope pull.
600 H.P. Vulcan DD, 3/60/2200.
300 H.P. Vulcan SD, 500 FPM, 3/60/440.
250 H.P. Vulcan SD, 2 Speed, 500/900 FPM.
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Industry rolls on

**TIMKEN**

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